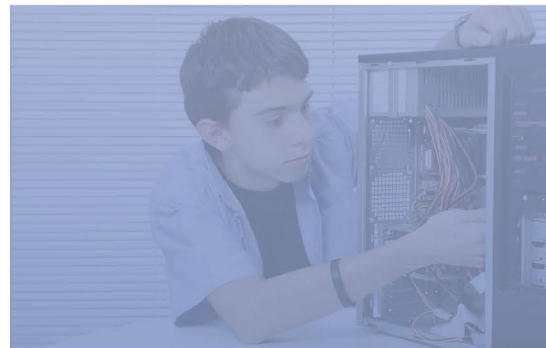


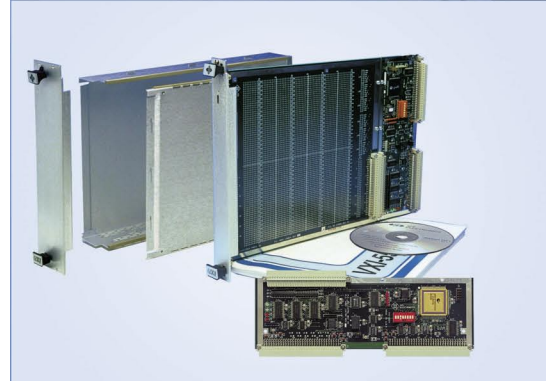
**Ethernet Interfaces**



**GPB Controllers**



**GPB Interfaces**



**VXI Kits & Interfaces**



# ICS Product Guide

*Your Test Partner for over 30 years!*



**ICS  
ELECTRONICS**  
*division of Systems West Inc.*

# Your Test Systems Partner for over 30 years!

I am pleased to introduce our 2011 Product Guide. While this year's Guide has new products in many areas, our emphasis in the past few years has been changing from GPIB to VXI and now to Ethernet. This gives us a more balanced product line and one that is more in tune with the way that our customers and their test equipment needs are evolving. Over the last several years we have been expanding our line of Ethernet Interfaces. Our Ethernet Interfaces are fully VXI-11 compliant and IEEE-488.2 compatible. This goes beyond the LXI Specification requirements and allows our Ethernet Interfaces to be easily operated on computers with Linux/Unix/OS X and similar operating systems as well as on Windows based computers.

Our new motto, "Your Test Systems Partner for over 30 years" says it all. Over the past 32 years, our philosophy has been to provide users with useful control and interface products to help them build instruments, specialized test chassis and test systems. We have done this by making sure that our products do what you want, meet accepted industry standards and are available for many years. Support is freely provided for the lifetime of all of our products.

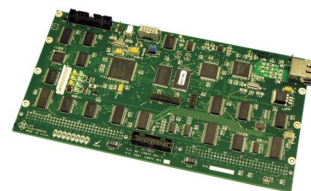
Product longevity is as important to us as it is to our customers. We try to avoid the fad ICs used by PC manufacturers due to their short lifespan and are continually updating our products to avoid product obsolescence. We have done this by migrating from EPROM to Flash based memory, switching to surface mount ICs as they became dominant, and more recently, converting all products to lead free components and RoHS construction. When we are forced to obsolete a product, we try to release a replacement product that a user can easily integrate into his system.



**8003 LAN Interface**

We also meet our customers needs by customizing our products to fit our customer's applications. This can be a minor change in the firmware of an existing product or by developing custom interfaces where essential to meet a new application. This year we customized the firmware of an 8003 Ethernet to Digital Interface Board to be a versatile Ethernet Interface to control switching systems. The firmware lets the user create custom switch chassis by simply specifying the number of relays and their characteristics.

In another case, we developed a custom VXI Controller board with Ethernet and GPIB Interfaces so that legacy VXI modules could be recombined into a smaller, less expensive test system with a modern VXI-11 LAN interface. We created a small VXI Controller board that fits in rear of their chassis.



**VXI Controller Board**

In yet another case, a customer wanted a VXI Module Shield kit that would enclose a PC Board laid out with a board outline from a company that was no longer in business. We did the design for them and ended up with a new VXI Module Shield Kit. They got the shields they needed. This was a win-win for both our customer and us.

In all this, we have not forgotten our GPIB heritage. We are just releasing our 488.2V4 Driver that supports 64-bit Windows operating systems for our GPIB Controllers and a new GPIB-to-LAN Interface that allows instruments with LAN interfaces to be used in a GPIB test system. The GPIB-to-LAN Interface provides test system managers a way to integrate instruments with only LAN interfaces into a GPIB oriented test system as a solution on how to replace an obsolete GPIB instrument with a newer instrument that only has a LAN interface.



In the coming year we will work on some new GPIB and LAN products and continue our product upgrades. Now as in the past, we are committed to producing quality interface and control products with long production spans so that you can always count on ICS products. We thank you for your patronage in the past 32 years and look forward to working with you for many years to come.

Sincerely,

A handwritten signature in cursive script.

Jerry Mercola  
Chief Executive Officer  
ICS Electronics

For more information, call 1-800-952-4499 or visit [www.icselect.com](http://www.icselect.com)

# Ethernet Connectivity and the VXI-11 Protocol

## INTRODUCTION

ICS is firmly committed to LAN (Ethernet) interfaces as one of the future architectures for test and measurement equipment. We are developing some new LAN devices and adapting our more popular GPIB interfaces for Ethernet applications with the goal of giving our customers products that will work anywhere. We believe that LAN devices that use a published protocol specification and adhere to industry accepted instrument standards have wider application than the LXI concept of undefined instrument protocols and custom IVI drivers for each instrument.

All of ICS's Ethernet interface products are VXI-11 compliant because VXI-11 provides a universal communication protocol that assures easy control of test equipment from virtually any computer or operating system. Our products operate equally on WIN32 PCs as well as on UNIX/LINUX or similar operating systems and in systems with LXI equipment. Our products are also fully IEEE-488.2 compliant. Adherence to both specifications exceeds the requirements of the LXI Specification and allows ICS interfaces to operate in a system with LXI devices.

## THE VXI-11 SPECIFICATION

The VXI-11 Specification was part of a suite of specifications developed in the early 1990s when the VXIbus concept was created. VXI-11 describes how instruments or other devices can be connected to industry-standard TCP/IP networks to create test systems. The communications and programming paradigms supported by the VXI-11 specification are similar in nature to the techniques supported by IEEE-488.1 and IEEE 488.2. The protocol allows ASCII-based communications to take place between a controller and a device over a computer network.

The VXI-11 Specification has the following objectives:

1. To allow ASCII messages, including IEEE 488.2 messages, and IEEE 488.1 instrument control messages to be passed between a controller and a device over a TCP/IP network.
2. To define an instrument protocol which can be used for this controller/device communication over a TCP/IP network.
3. To enable the interconnection of independently manufactured apparatus into a single functional system.
4. To provide a mechanism to extend the protocol.
5. To define an instrument protocol which can support diverse application interfaces.
6. To allow for other networking protocols as the functionality of devices and controllers dictate, such as NFS or telnet.

The VXI-11 Specification has three sub-sections:

VXI-11.1 which deals with connecting VXIbus devices to a network and is not used in our products.

VXI-11.2 deals with connecting GPIB instruments to a network though a Gateway like ICS's 8065 or Agilent's E5810A Ethernet-to-GPIB Controller.

VXI-11.3 deals with connecting IEEE-488.2 instruments with Ethernet interfaces directly to a network. Examples are ICS's 8064 Relay Interface or ICS's 8099 Modbus RTU Controller.

## NETWORK INSTRUMENT PROTOCOL

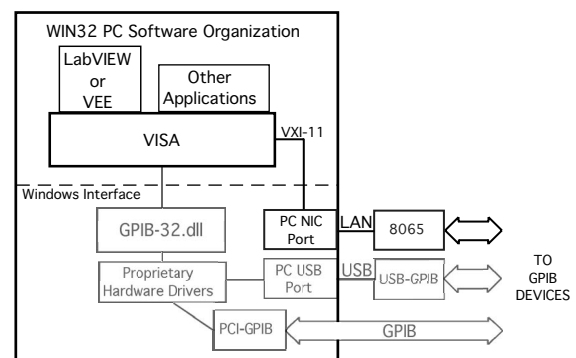
In order to allow ASCII messages and IEEE-488.1 instrument control messages to pass over a TCP Network, the VXI-11 Specification created 17 Instrument Messages based on the ONC Remote Procedure Call (RPC) model. This model allows an application (the client) to call procedures in a remote application or device (the server) as if the remote procedures were being executed locally. The Instrument Messages will be familiar to anyone who has worked with GPIB instruments and provide a full range of control over a GPIB bus and its instruments.

The client creates a Core channel for communicating with a VXI-11.2 Gateway or a VXI-11.3 Instrument. Communication pathways (Links) are then created to each logical entity or device.

## PROGRAMMING VXI-11 DEVICES

There are two major ways to program VXI-11 Devices: make calls to a VXI-11 compliant VISA library or install the VXI-11's RPCL in your computer and write your program with RPC calls. Windows users will find it easier to use a VISA library from Agilent or National Instruments, and program with graphical programs like National Instruments' LabVIEW or Agilent's VEE or to make VISA calls from familiar programming languages such as C/C++ or Visual Basic. UNIX, LINUX, and similar operating system users (Apple, HP, Sun, etc.) will find it easier to install the VXI-11 RPCL on their computer and then to write the application program in C or C++. ICS has numerous Application Bulletins at <http://www.icselect.com> that provide more information about RPC programming and provide program examples.

Figure 1 shows the VXI-11 communication path through VISA to a GPIB Gateway. A VXI-11.3 Instrument would connect directly to the LAN connection.



**VXI-11 VISA Communication Path**

To sum up, ICS's LAN (Ethernet) interfaces and Gateways can be treated just like GPIB devices. They have an advantage in that they can be remotely controlled over a company network or over the Internet which overcomes the GPIB bus distance limits. To obtain a more information about VXI-11 download Application Bulletin AB80-11 from ICS's website at <http://www.icselect.com>.



# LAN (Ethernet) to GPIB Controllers (Gateways)

ICS's LAN (Ethernet) to GPIB Controllers and Interfaces expand the way you can control and interface instruments in your Test and Measurement Systems

ICS's new Ethernet Interfaces are providing test engineers with new ways to build and control test systems using the company network or Internet as the communication path. The 8065 Ethernet to GPIB Controller lets you control multiple GPIB Instruments over the network. The 8055 acts as a LAN interface for a single GPIB instrument. The 8055-GPIB Instrument combination appears as a VXI-11.3 compatible LAN instrument.

ICS's 8065 is adaptable to virtually any operating system. Windows systems can use a VXI-11 compatible VISA layer for LabVIEW, C/C++, VB or VEE programs. Unix/Linux and similar operating systems have an RPCgen utility that converts the VXI-11 Specification RPCL (RPC Library) into the unique files needed for that operating system and your C/C++ test program. No more struggling with a buggy driver or being stuck to an older operating system due to driver compatibility. ICS has many Application Notes that describe how to use and develop RPC test programs.

All ICS 80xx products also include an internal HTML webserver with a Welcome page and a Configuration Page that can be accessed by any web browser. This simplifies the setup process especially for Linux/Unix/Sun OS/OS X or similar operating system users. All ICS 80xx products include the following utilities:

**VXI-11 Keyboard** - ICS's interactive keyboard utility program (VXI-11kybd) for operating VXI-11.2 Controllers and VXI-11.3 Instruments from a WIN32 PC. The VXI-11kybd program scans for VXI-11 controllers and instruments, links to them and lets the user control them without having to write a program.

**VXI-11\_Configure** - A menu driven, configuration utility for WIN32 PCs that walks the user through the 80xx configuration settings.

## Ethernet to GPIB Controllers and Service Software

### 8065 Ethernet to GPIB Controller (Gateway) ✓

Controls multiple GPIB bus devices over a company network or over the Internet.

- VXI-11.2/VXI-11.3 compliant for GPIB bus and instrument control.
- Control from Windows PCs using LabVIEW, VEE, Visual Basic or C languages.
- Control from Linux/Unix/Apple/Sun OS etc.systems with RPC over TCP.
- JAVA and other example programs are available on SourceForge or on ICS's Website.
- Shares control of GPIB devices and test systems among multiple users.
- Includes ICS's VXI-11 Keyboard Utility to control instruments without a program.
- IEEE-802.11 10/100 Mb interface.

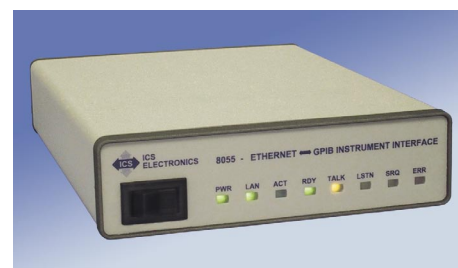


8065 Ethernet to GPIB Controller

### 8055 Ethernet to GPIB Instrument Interface ✓

Adapts a single GPIB Instrument for use in an Ethernet based test system.

- VXI-11.2/VXI-11.3 compliant for GPIB bus and instrument control.
- Control from WIN32 PCs using LabVIEW, VEE, Visual Basic or C languages.
- Control from Linux/Unix/Apple/Sun OS etc.systems with RPC over TCP.
- JAVA and other example programs on SourceForge or on ICS's Website.
- Shares control of the GPIB device among multiple users.
- GPIB address track feature follows instrument's primary address changes.
- Includes ICS's VXI-11 Keyboard Utility to control instruments without a program.
- IEEE-802.11 10/100 Mb interface.

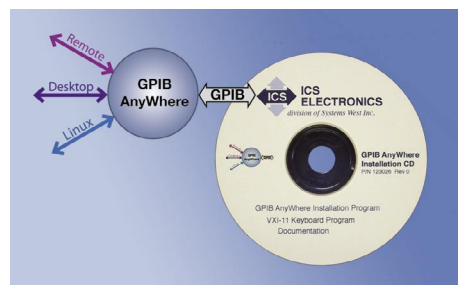


8055 Ethernet to GPIB Instrument Interface

### GPIB AnyWhere™ Ethernet to GPIB Service Software

Converts any WIN32 computer with a GPIB-32.DLL and GPIB Controller into a network controllable, VXI-11.2 GPIB Controller. Free with purchase of any ICS GPIB Controller.

- Provides Linux/Unix users control of the GPIB bus through a spare WIN32 PC.
- Compatible with most WIN32, Linux and Unix VISAs.
- Communicates with RPC protocol over TCP/IP.
- Ideal for remote control and debugging of GPIB systems.



GPIB AnyWhere CD

**A new 4865 GPIB to Ethernet Interface is listed on page 9.**

**Accessory cables and connectors are shown on pages 17-19.**

**For more information, call 1-800-952-4499 or visit [www.icselect.com](http://www.icselect.com)**

# Ethernet Interfaces

ICS has introduced several new LAN (Ethernet) Interfaces which expand the way you can control devices and interface your Test and Measurement Systems

ICS's Ethernet Interfaces provide the test engineer with new ways to build and control instruments and test systems using the company network or Internet as the communication path. All Interfaces are VXI-11 compatible and can be programmed with traditional languages like C and Visual Basic, with graphical application programs such

as LabVIEW and VEE or with ICS's VXI-11 Keyboard Utility. All of ICS's LAN (Ethernet) Interfaces are compatible with LXI instruments and have an internal WebServer with user alterable HTML pages that let you see the unit's status and change its configuration and IP settings with your favorite browser.

## Ethernet Interfaces

### 8003 Ethernet to Digital Interface Card



Provides an Ethernet controlled Digital Interface with 40 user configured I/O lines.

- VXI-11.3 compliant for easy control from Windows and Linux/Unix systems.
- 40-line parallel interface is user configured in 8-bit bytes as inputs or latched outputs.
- Interface commands handle bits, bytes or multi-byte word I/O with multiple formats.
- Heavy duty digital I/O lines source 24 mA and sink 48 mA.
- Interchangeable with ICS's 4803 GPIB-to-Digital Interface Card.
- Available Chassis Wiring Kit mounts Ethernet connector on chassis rear panel.
- Companion Relay Driver Board provides relay drivers and up to 8 TTL I/O lines.



8003 Ethernet to Digital Interface

### 8013 Ethernet to Digital Interface Card



Provides an Ethernet controlled Digital Interface with 128 user configured I/O lines.

- VXI-11.3 compliant for easy control from Windows and Linux/Unix systems.
- 128-line parallel interface is user configured in 8-bit bytes as inputs or latched outputs.
- Interface commands handle bits, bytes or multi-byte word I/O with multiple formats.
- Heavy duty digital I/O lines source 24 mA and sink 48 mA.
- Command compatible with ICS's 4813 GPIB-to-Digital Interface Card
- Available Chassis Wiring Kit mounts Ethernet connector on chassis rear panel.
- Companion Relay Driver Board provides 128 relay drivers and up to 32 TTL I/O lines.



8013 Ethernet to Digital Interface

### 8063 Ethernet to Digital Interface Module



Provides an Ethernet controlled Digital Interface with user configured I/O lines.

- VXI-11.3 compliant for easy control from Windows and Linux/Unix systems.
- 48-line parallel interface is configured in 8-bit bytes as inputs or latched outputs.
- Interface commands handle bits, bytes or multi-byte words I/O with multiple formats.
- Heavy duty digital I/O lines source 24 mA and sink 48 mA.
- Command compatible with ICS's 4863 GPIB-to-Digital Interface.
- Board only version available for in chassis installations.



8063 Ethernet to Digital Interface

### 8064 Ethernet to Relay Interface Module



Provides Ethernet controlled relay contacts or driver signals for controlling, scanning, or switching signals and a 8 bit parallel interface.

- VXI-11.3 compliant for easy control from Windows and Linux/Unix systems.
- Choice of 16 form 'A' low level contacts, hi-current contacts or relay driver outputs.
- 8 isolated digital inputs can be monitored for changes and generate an intr\_SRQ.
- Board only version available for in chassis installations.
- 8064 webserver includes prototype HTML Relay Control Page.



8064 Ethernet to Relay Interface

### 8099 Ethernet to Modbus RTU Interface



Provides Ethernet to Modbus RTU serial interface.

- VXI-11.3 compliant for easy control from Windows and Linux/Unix systems.
- RS-232 and RS-485 serial I/O ports.
- 8099 webserver includes prototype HTML pages for controlling Watlow F4 and EZ Zone Temperature Controllers.



8099 Ethernet to Modbus RTU Interface

Accessory cables and connectors are shown on pages 17-19.

For more information, call 1-800-952-4499 or visit [www.icselect.com](http://www.icselect.com)

# GPIB Bus Description

ICS provides a wide range of proven GPIB products to complete any Test, Measurement or Control System. This includes GPIB Controllers, GPIB bus interfaces that adapt virtually any device to the GPIB bus, stand-alone GPIB Minibox™ interfaces, Bus extension devices and GPIB bus cables.

**GPIB Bus Background** - Since the GPIB bus's creation in 1974 by Hewlett-Packard, the GPIB bus has become the most popular method for assembling a Test, Measurement or Control system. Today there are well over 5,000 GPIB instruments.

The basic concept is that each device contains a standard interface with known capabilities that can be interconnected in parallel with other GPIB devices. GPIB bus cables have dual headed connectors that can be stacked to make star configurations or daisy-chained to make serial system topographies. This makes it easy to quickly assemble a complete test system. Data is transferred as strings of 8-bit characters at rates up to 1 Mbs (original specification). There are no restrictions on the data format.

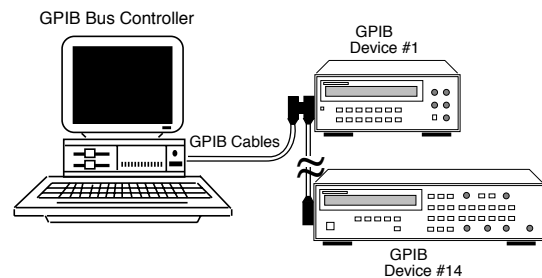
**IEEE-488.2** - In 1987, the original IEEE-488 Standard was enhanced with the addition of the IEEE-488.2 Standard which added Common Commands, a Status Reporting Structure, Controller Protocols and standardized data formats to simplify user programming. The original Standard was renumbered as IEEE-488.1.

The IEEE-488.2 data formats standardized message terminators and eliminated protocol conflicts between different instrument manufacturers. The new Common Commands that gave users a way to query the device's identity, set/query/clear its status reporting structure, reset the device and save its operating configuration. Since 1987, the IEEE-488.2 Standard has become the standard for instrument manufacturers as they migrate new instruments to other interfaces.

**SCPI Commands** - In 1990, Hewlett-Packard developed the TMSL programming language which later became the Standard Command Language for Programmable Instruments (SCPI). The SCPI command concept provides standard commands for instruments so that similar instruments from different manufacturers can be interchanged without having to modify the test program. SCPI commands are built on standardized keywords and branch out to create a specific function. An example is 'SYSTem:COMMunicate:SERial:BAUD 9600'. SCPI commands can be abbreviated as shown by the capital letters in the above example and can also become a query by ending the command with a question mark. i.e. 'SYSTem:COMMunicate:SERial:BAUD?'

**System Design** - A typical GPIB bus system has a Bus Controller and one or more Devices with Talker/Listener capability. The Bus Controller sends commands to the devices and addresses the other devices to listen or to talk. Today the typical Bus Controller is an Intel type PC with an internal GPIB Controller Card or with an external USB Module. LAN (Ethernet) to GPIB Gateways (Controllers) are becoming more popular as engineers move to network oriented test systems and/or LINUX/UNIX type operating systems. Programming examples and utility programs exist for virtually any language.

Devices are typically instruments but they can be any type of device with a GPIB interface such as a custom test chassis, a temperature chamber, etc. ICS's GPIB interface cards allow test engineers to put together a GPIB controlled test chassis without having to design the GPIB interface.



*Typical GPIB System with a PC Controller*

**GPIB Bus Limitations** - The GPIB bus has three limitations which should be considered when building a GPIB bus system:

- 1 - The maximum cable length in a GPIB bus system should not exceed 20 meters and the cable length between devices should not exceed 2 meters for a maximum data transfer of 1 Mbytes per second. For longer cable distances use a pair of Bus Extenders.
- 2 - A GPIB Controller or device can only drive up to 14 other devices. Use a Bus Expander/Isolator to expand the GPIB Controller's drive capability to handle more devices or to eliminate ground loops or noise.
- 3 - The GPIB bus has 32 primary addresses from 0 to 31. 30 primary addresses are available for use by the other GPIB devices. Systems needing more addresses can use a second GPIB Controller for some of the instruments.

Refer to ICS Application Bulletin AB48-12 for a detailed description of how to overcome the GPIB Bus limitations.

**GPIB Bus Cables** - Use good multi-shielded bus cables to minimize noise and avoid data crosstalk. A low cost bus cable that corrupts bus data transmissions is no bargain when you have spent several days tracking down the problem.

**The Future of GPIB** - People continue to speculate on the future of GPIB. Will LAN (LXI) architectures replace GPIB or does Hi-Speed USB offer better performance? These are critical questions for today's systems designers. GPIB systems have many advantages that will keep them around for some time.

- A huge variety of instruments available. Now over 5,000.
- Moderate system cost.
- Ease of assembly and high level graphical languages. You hear statements like 'it just works' from many test engineers.
- Compatibility with existing test systems reduces maintenance and spares problems.
- High system data rates. LAN/LXI systems have slower effective throughput rates and are subject to network collisions. Some USB systems have fast data transfer rates but it doesn't speed up the overall test system.
- Simple triggering and solid system timing. LAN/LXI systems continue to fight this problem with expensive add-on solutions.

**GPIB Tutorial** - The above information is only a brief overview of the GPIB bus. To obtain a more detailed tutorial about the GPIB bus, you can download Application Bulletins AB48-11 and AB48-12 from ICS's website at <http://www.icselect.com>.

# GPIB Bus Controllers

ICS's GPIB Bus Controllers are the easiest and most cost effective GPIB Controllers in the industry.

ICS provides a wide range of GPIB Controllers that let you control your GPIB Instruments from a USB port, a PCI bus, a PXI bus, an ISA bus, over a serial link or over a network. However you want to do it, ICS has you covered.

ICS's 488-USB2, 488-LPCI and 488-PXI Controllers are RoHS compliant and are supported by ICS's latest 488.2V4 Driver. The 488.2V4 Driver is compatible with 32 and 64-bit Windows operating systems. The Driver utilities includes the ICS Explorer which quickly scans and displays all compatible controllers and instruments in a

tree structure. Quick links to the Configure and Communicate pages let you modify the Controller's configuration, add multiple GPIB Controllers to your system or control your instruments.

Our 8065 Ethernet to GPIB Gateway and 8055 Ethernet to GPIB Instrument Interface are described on Page 4. Both work on Linux/ Unix/OS X and Windows operating systems. The 488-PC2 Card is available for legacy ISA Bus systems. The Model 4895 is for customers who need to control GPIB devices over a serial link.

## GPIB Controllers

The 8065 Ethernet to GPIB Controller is described on page 4

### 488-USB2 USB to GPIB Controller Module

USB 2.0 Module. Controls the GPIB Bus from any USB 2.0 or 1.1 port.

- Data transfer rates > 1Mbytes per second with USB 2.0 ports.
- Includes 32 and 64-bit Windows Driver Libraries with NI style commands.
- Runs LabView, Agilent (HP) VEE and most major application programs.
- Includes ICS's Explorer and GPIBkybd utility programs for controlling GPIB devices.

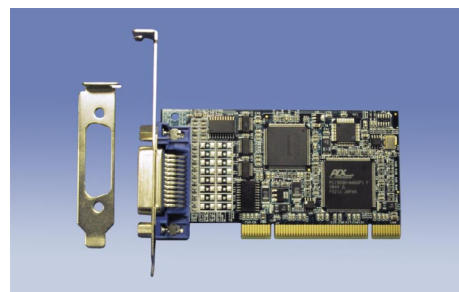


488-USB2 GPIB Controller Module

### 488-LPCI PCI GPIB Controller Card

Converts any Intel type PC with a PCI bus into an IEEE 488.2 GPIB Bus Controller.

- Includes 32 and 64-bit Windows Driver Libraries with NI style commands.
- Runs LabView, Agilent (HP) VEE and most major application programs.
- High data transfer rates up to 1 M bytes/second.
- New low profile card fits all PCI chassis.
- Includes ICS's Explorer and GPIBkybd utility programs for controlling GPIB devices.

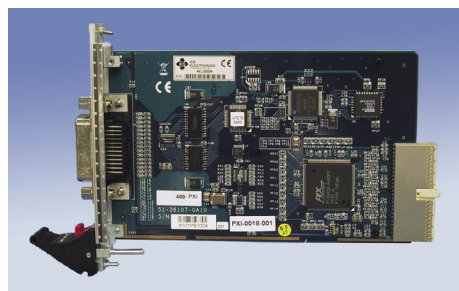


488-LPCI Card

### 488-PXI PXI-Compact PCI GPIB Controller Card

Adds GPIB Controller capability to any PXI or Compact PCI chassis.

- Includes 32 and 64-bit Windows Driver Libraries with NI style commands.
- Runs LabView, Agilent (HP) VEE and most major application programs.
- High data transfer rates up to 1 M bytes/second.
- Includes ICS's Explorer and GPIBkybd utility programs for controlling GPIB devices.



488-PXI cPCI Compact PCI GPIB Controller

### 488-PC2 ISA GPIB Controller Card

Classic 7210 GPIB Controller Card for legacy ISA systems.

- Supports ICS 488.2 Driver commands.
- Runs in Microsoft DOS and Windows 3.1/95/98 operating systems.
- Supports C, Pascal, Borland, VB, GWBASIC, QB4.5.
- Includes PC2\_kybd utility program for controlling GPIB devices.
- Generic 7210 card replaces many obsolete ISA GPIB cards.

### 4895 Serial to IEEE-488.2 Controller

Controls the GPIB Bus from an RS-232, RS-422 or RS-485 Serial source. May also be used as a GPIB to Serial Interface.

- Easy to program HP Rocky Mountain BASIC style commands.
- Includes M95\_kybd program for controlling GPIB devices without a program.
- Includes 6 foot long serial cable.



488-PC2 ISA GPIB Controller



4895 Serial-to-GPIB Bus Controller

Accessory cables and connectors are shown on pages 17-19.

For more information, call 1-800-952-4499 or visit [www.icselect.com](http://www.icselect.com)



# GPIB Bus Extension Products

ICS's Bus Extension products overcome the GPIB bus limitations of distance, driver fanout and address space while providing device isolation. Device sharing is now possible with the 4842 Bus Switch.

## GPIB Expanders and Isolators

### 4860A Bus Isolator & Expander

Minibox™ GPIB bus Isolator-Expander increases bus fanout to drive up to 14 additional devices and adds an extra 20 meters of bus cable.

- Automatic controller location, no address switches to set.
- Works with all IEEE-488.2 devices and most older 488.1 devices.
- Invisible to most bus controllers.
- Provides 2000 volts of isolation between the main and isolated bus.
- Negligible affect on bus data transfer speed.
- IEEE-488.2 compatible - does not report false instrument addresses.

### 4862A Bus Buffer & Expander

Non-isolated version of the 4860A described above.



4860A and 4862A Bus Expanders

## GPIB Bus Switch

### 4842 Bus Switch for 2 or 3 buses

GPIB controlled 3:1 Multiplexer or a 1:3 way Bus Switch.

- Allows two or three GPIB controllers access to a common set of bus devices.
- Allows a single bus controller to operate up to 3 buses and up to 52 devices.
- Minimal internal delay for very high data rates.
- Fully controlled from the GPIB Bus.



4842 Bus Switch

## GPIB Bus Extender

### 4897/4897L High-Speed Bus Extenders

High speed bus extension with dual metallic conductor or dual fiber-optic cable.

- Buffered mode data rate >660 Kbytes/second for distances up to 4 km.
- Standard handshake data rate >83Kbytes/second for short distances.
- Metallic interface drives twisted shielded pairs up to 200 meters or dual coaxial cables up to 300 meters.
- Fiber-optic interface drives multi-mode fiber > 4,000 meters.
- 4897L version drives single mode fiber > 15,000 meters.
- IEEE-488.2 compatible - does not report false instrument addresses.
- Replaces older Hewlett-Packard, ICS and other obsolete extenders.



4897 Bus Extender

### 115364 DE-9P to BNC Adapter

Adapts coaxial cables with BNC connectors to the 4897's DE-9 connector.

- Provides two female BNC connections for coaxial cable connections.



DE to BNC Adapter

ICS's GPIB Interfaces easily add Printers, Serial Devices, Digital Signals, Analog I/O, Thermocouples and Relay Contacts to any test system. Board versions are shown on pages 12-13.

## GPIB Interfaces

### 4892B GPIB ↔ Printer Interface

Drives any printer with a Centronics interface from the GPIB bus.

- Use PCL 5/HPGL compatible printers to replace obsolete plotters
- Large RAM buffers 220 Kbytes of data.
- High-speed DMA GPIB input for fast data transfer.
- Includes 5 foot Printer Cable.



4892B GPIB to Printer Interface

Accessory cables and connectors are shown on pages 17-19.

For more information, call 1-800-952-4499 or visit [www.icselect.com](http://www.icselect.com)



# GPIB Interface Products

## GPIB Interfaces continued

### 4894B

#### GPIB ↔ Serial Interface



Adds an IEEE-488.2 interface to any device with a RS-232, RS-422 or RS-485 serial interface.

- Baud rates from 50 to 115.2 Kbaud.
- Large RAM buffers 252,000 bytes of data to off load the GPIB Bus Controller.
- 100% transparent GPIB-to-Serial conversion handles ASCII or binary data.
- S-mode for controlling a single GPIB device from a serial source.



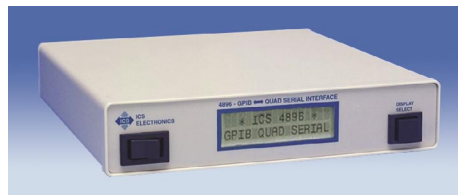
4894B High-Speed Serial Interface

### 4896

#### GPIB ↔ Quad Serial Interface

Provides four independent RS-232/RS-485 serial channels from the GPIB bus.

- Four hi-speed serial channels with independent baud rates from 50 to 115.2 Kbaud.
- Adjustable 64 kilobyte buffers for each channel.
- Full or half duplex operation in RS-485 mode.
- IEEE-488.2 Status Reporting Structure includes buffer status and break detection.
- LCD display shows GPIB and buffer status, serial activity and signal levels.



4896 Quad Serial Interface

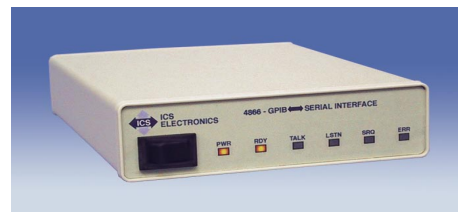
### 4866

#### IEEE-488.2 to Serial Interface



Adds a smart IEEE-488.2 GPIB interface to devices with an RS-232 serial interface. Transparent GPIB-to-serial conversion less 488.2 and SCPI Setup commands.

- Provides all IEEE-488.2 functions and Status Reporting Structure responses.
- GPIB address and serial configuration set and saved by SCPI or serial commands.
- Supports handshaking, X-on/X-off protocol and rates up to 115.2 Kbaud.
- Multiple modes for handling asynchronous, normal or smart serial devices.
- Smart mode allows embedded controller to modify Status bits and generate SRQs.



4866 Smart Serial Interface

NEW!

### 4861B

#### GPIB ↔ Analog Interface



Provides analog and digital signals to control analog devices, reads voltages and monitors digital signals for feedback information.

- Two or four isolated analog outputs with  $\pm 10$ ,  $\pm 5$  or 0 to +10 volt ranges.
- Four floating differential analog inputs with ranges of 0.1, 1 or 10 volts.
- Four high current driver outputs sink up to 300 mA.
- Eight digital inputs for reading or monitoring external digital signals.



4861B GPIB Analog Interface

### 4863

#### GPIB ↔ Parallel Digital Interface



Provides 48 TTL digital lines for transferring parallel BCD/HEX or Binary data to or from the GPIB Bus.

- User configurable parallel interface as inputs or outputs in 8 bit bytes.
- Outputs are latched with 24 mA source, 48 mA sink capability.
- Inputs have pullup resistors for TTL/CMOS and contact closure inputs.
- Transfers digital data as bits, bytes, as data strings or as hi-speed binary data.
- Monitors up to 15 inputs and can generate an SRQ when a signal changes state.



4863 GPIB Parallel Digital Interface

### 4864

#### GPIB ↔ Relay Output



Provides relay contacts or drive signals for controlling, scanning, or switching signals and eight isolated input lines.

- Choice of 16 form 'A' low level or hi-current contacts or relay driver outputs.
- Operate relays individually, as a 1 to 8 pole scanner or in a preset sequence.
- 8 isolated digital inputs can be monitored for changes and generate an SRQ.
- See new I/O terminal board options on page 15.



4864 GPIB Relay Interface

NEW!

### 4865

#### GPIB ↔ LAN Instrument



Adds a GPIB Interface to any VXI-11 compatible instrument with an Ethernet connection.

- Automatically finds and links to the VXI-11 instrument at its auto-IP address.
- Transparently passes all commands to the LAN instrument.
- Generates GPIB SRQs using VXI-11 reverse channel notification.
- Allows LXI (LAN) instruments to replace obsolete GPIB instruments.
- Internal webserver for easy configuration with any web browser.



4865 GPIB to LAN Instrument Interface

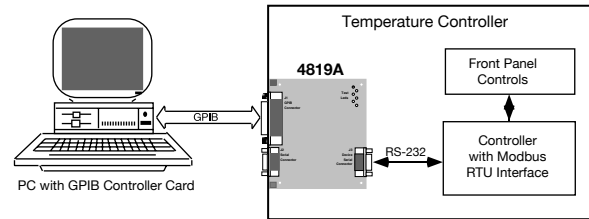
Accessory cables and connectors are shown on pages 17-19.

For more information, call 1-800-952-4499 or visit [www.icselect.com](http://www.icselect.com)

# GPIB ANSI and Modbus Controllers

ICS's GPIB-to-Modbus RTU and GPIB-to-ANSI X3.28 Interfaces greatly simplify the control of these devices by internally handling the protocol conversion. Ethernet-to-Modbus version is on page 5.

ICS's GPIB-to-Modbus RTU and GPIB-to-ANSI X3.28 Interfaces handle the protocol conversion and use simple ASCII commands to control and query devices that use the Modbus RTU or ANSI X3.28 protocol. Both types of interfaces are available in Minibox™ form for desktop and rack mounted use or as PC boards for mounting inside a temperature chamber or system. ICS's GPIB-to-Modbus and GPIB-to-ANSI X3.28 Interfaces are supported with several Application Bulletins, example Visual Basic programs and LabVIEW Drivers.



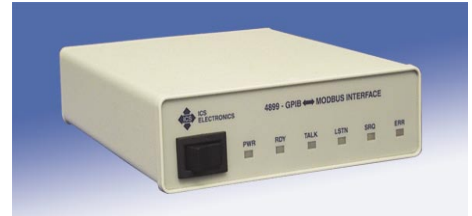
4819A Modbus Controller embedded in a Temperature Chamber

## GPIB to Modbus Controllers

### 4899A GPIB Modbus Controller

Controls a RS-232 or RS-485 Modbus device from the GPIB bus with simple commands. ✓

- Flexible serial interface drives RS-232/RS-422 or RS-485 Modbus RTU devices.
- Programmable baud rates from 50 to >115.2 Kbaud.
- Off-loads the computer by doing all Modbus packet assembly, CRC generation, packet checking and protocol conversion.
- Small Minibox™ metal case shields EMI/RFI.

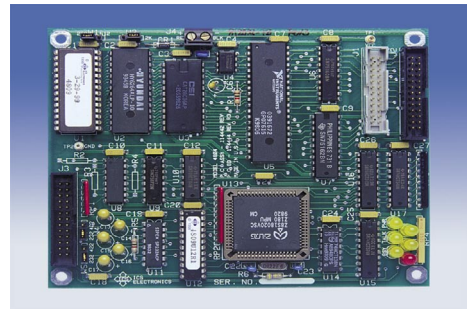


4899A GPIB Modbus Controller

### 4809A GPIB Modbus Controller Board

Controls a RS-232 or RS-485 Modbus device from the GPIB bus with simple commands. ✓

- Flexible serial interface drives RS-232/RS-422 or RS-485 Modbus devices.
- Off-loads the computer by doing all Modbus packet assembly, CRC generation, packet checking and protocol conversion.
- Programmable baud rates from 50 to 115.2 Kbaud.
- Small 4.5 in x 5.5 in board is easily mounted in host chassis.
- Mates with ICS's GPIB Connector/Switch Boards.



4809A GPIB Modbus Controller Board

### 4819A GPIB & Serial Modbus Controller Board

Provides GPIB and Serial interfaces to control a RS-232 Modbus device. ✓

- Small 4.5 in x 4.0 in board mounts on rear panel of host chassis so GPIB and Serial connectors protrude through the panel.
- GPIB interface does the Modbus RTU protocol conversion.
- Programmable GPIB address, IDN message, data format and baud rates.
- Serial interface is a straight through connection to the Modbus device.

### 4829A GPIB & Serial Modbus Controller Board

Provides GPIB and Serial interfaces to control RS-485 Modbus device(s). ✓

- Same as 4819A above except controls RS-485 Modbus RTU device(s).
- Provides rear panel RS-232 to internal RS-485 signal conversion.



4819A and 4829A  
GPIB & Serial Modbus Controller Boards

## GPIB to ANSI X3.28 Controllers

### 4894B-7 w/F30146 GPIB ANSI X3.28 Controller

Controls RS-232 or RS-422/RS-485 ANSI X3.28 devices from the GPIB bus. ✓

- Program F30146 handles the ANSI X3.28 ACK/NAK protocol and non-printable characters.
- RS-422/RS-485 interface drives multiple ANSI X3.28 devices.

### 4804B-7 w/F30145 GPIB ANSI X3.28 Controller Board

Controls RS-232 or RS-422/RS-485 ANSI X3.28 devices from the GPIB bus. ✓

- Small 4.5 in x 5.5 in 4804B board with ANSI X3.28 protocol program.
- Mates with ICS's GPIB Connector/Switch Boards.
- Use 4804B-7 w/F30145 program to replace old ICS 4814-11 boards.



4894B-7 GPIB to ANSI X3.28 Controller

Accessory cables and connectors are shown on pages 17-19.

For more information, call 1-800-952-4499 or visit [www.icselect.com](http://www.icselect.com)

# Data Acquisition and Control Products

ICS's Data Acquisition and Control Products provides analog, digital and relay driver outputs for controlling devices and has analog, digital and temperature inputs for reporting device status.

Signal pinouts and firmware commands are the same for all four DAQ products so the user can interchange the products to get the desired interface and form factor for his application. The companion DAQ Terminal Board makes it easy to attach test signals to all of

the DAQ products. Software support includes a LabVIEW driver and an example Visual Basic program that lets you configure and run the various interfaces.

## Data Acquisition & Control Boards

### 4807 GPIB Data Acquisition & Control Board

Provides analog and digital signals to control devices and reads voltages, digital signals and temperatures.

- IEEE-488.2 compatible interface with SCPI command parser.
- Four 0 to 5 Volt analog outputs.
- Six analog inputs with programmable input ranges of +5, +10,  $\pm 5$  or  $\pm 10$  V.
- Six high current driver outputs sink up to 300 mA.
- 32 bidirectional digital I/O lines for reading or controlling digital signals.
- Four type J thermocouple inputs measure temperature over a -100 to +400 °C range.
- Runs on 5 Vdc power.

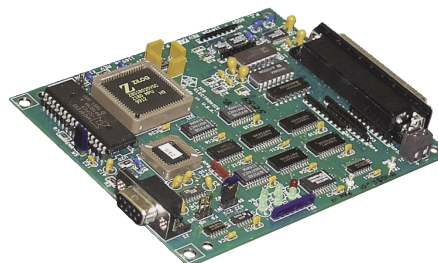
### 2307 Serial Data Acquisition & Control Board

Provides analog and digital signals to control devices and reads voltages, digital signals and temperatures. Full 488.2 functionality over a serial link.

- Same analog, digital relay drivers and thermocouple inputs as the 4807.
- Selectable RS-232, RS-422 or RS-485 interface signals.
- Operates in point-to-point connections or on a network with optional packet protocol for secure data transmission.
- Runs on 5 Vdc power.



4807 GPIB Data Acquisition and Control Board



2307 Serial Data Acquisition and Control Board

## Data Acquisition & Control Miniboxes

### 4867 GPIB Data Acquisition & Control Minibox™

Provides analog and digital signals to control devices and reads voltages, digital signals and temperatures.

- IEEE-488.2 compatible interface with SCPI command parser.
- Four 0 to 5 Volt analog outputs.
- Six analog inputs with programmable input ranges of +5, +10,  $\pm 5$  or  $\pm 10$  V.
- Six high current driver outputs sink up to 300 mA.
- 32 bidirectional digital I/O lines for reading or controlling digital signals.
- Four type J thermocouple inputs measure temperatures over -100 to +400 °C.
- Packaged in small 7 in x 7 in x 1.5 in RFI proof metal case.
- Runs on AC or DC power.



4867 GPIB Data Acquisition and Control Box

### 2367 Serial Data Acquisition & Control Minibox™

Provides analog and digital signals to control devices and reads voltages, digital signals and temperatures. Full 488.2 functionality over a serial link.

- Same signals, specifications, size and power as the 4807 but with a serial interface.
- Selectable RS-232, RS-422 or RS-485 interface signals.
- Operates in point-to-point connections or on a network with optional packet protocol for secure data transmission.



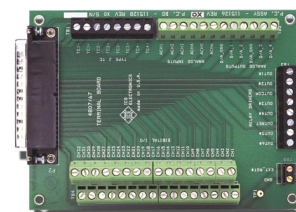
2367 Serial Data Acquisition and Control Box

## Terminal Interface Card

### 115124 DAQ Terminal Board

Provides screw terminals for quick connection of analog, digital, relay and thermocouple leads.

- Plugs directly into all 23x7 and 48x7 DAQ boards and box products.
- All terminals clearly identified to simplify the connection process.



2307/4807 DAQ Terminal Board

Accessory cables and connectors are shown on pages 17-19.

For more information, call 1-800-952-4499 or visit [www.icselect.com](http://www.icselect.com)



# GPIB - Digital Interface Cards

Cost effective solutions for interfacing virtually any digital device to the GPIB bus

ICS's GPIB to Digital Interface Cards are flexible enough to satisfy most OEMs' needs yet are easy enough to use for individual applications. All of ICS's Interface Cards are IEEE-488.2 compatible and have programmable IDN messages and configuration parameters that personalize the card to the user's application.

The GPIB to Digital Interface cards on this page provide 40 to 128 digital I/O lines that can be set as inputs or outputs in 8-bit byte increments. Data can be transferred by direct writes (reads) to a byte, by multiple byte wide transfers or by bit manipulation commands.

The TTL output drivers on all of the boards can sink 48 mA and source 24 mA. Companion Relay Driver boards for the 4803 and 4813 boosts the sink current to 300 mA per line and can operate 5 to 32 volt relays or solenoids.

OEM Starter Kits and Software Development Kits (SDKs) are available for our more popular boards. ICS's Interface Cards save the OEM several man-months of development time and help bring the product to market earlier. Secondly with their low cost, they continue saving over the life of the product.

## GPIB to Digital Interface Cards

### 4803

#### IEEE-488.2 to Parallel Digital Interface



Provides a GPIB interface to control devices with 40 parallel digital signals.

Small 4.5 in. x 5.5 in. board.

- 40 line parallel interface is user configured in 8-bit bytes as inputs or latched outputs.
- Data transfer by bits, bytes or multi-byte wide words.
- User programmable data polarities, control lines and data handshaking.
- GPIB Address set by SCPI commands or by an external address switch.
- User set IDN message personalizes the 4803 as part of user's product.
- Setup configuration saved in Flash memory.
- Available with circuit side connector for 'piggyback' mounting.
- Mates with ICS's GPIB Connector/Switch Boards or GPIB Flat Ribbon Cable.

### 115490

#### 4803 Relay Driver Board



Provides 40 heavy duty 300 mA relay drivers for 4803 boards with circuit side connector.

- User configurable as 24, 32 or 40 Relay Drivers with 16, 8 or 0 TTL I/O lines.
- Convenient screw terminals for relay, digital I/O signals and power connections.
- 12-32 Vdc input. Internal supply provides 5 Vdc for 4803 board.

### 4823B

#### IEEE-488.2 to Parallel Digital Interface



Provides a GPIB interface to control devices with 56 parallel digital signals.

Small 3.9 in. x 6 in. VME size board.

- 56 line parallel interface is user configured in 8-bit bytes as inputs or latched outputs.
- Same firmware and commands as the 4803 Interface Card but with 56 I/O lines.
- Pinouts and board size same as ICS's older 4823A board.
- Heavy duty digital I/O lines source 24 mA and sink 48 mA.
- Available with circuit side connector for 'piggyback' mounting.
- Available Starter Kit and SDK for custom firmware.

### 4813

#### IEEE-488.2 to Parallel Digital Interface



Provides a GPIB interface to control devices with 128 parallel digital signals.

- 128 line parallel interface is configured in 8-bit bytes as inputs or latched outputs.
- Same firmware and commands as the 4803 Interface Card but with 128 I/O lines.
- Uses 3 row x 50 pin connector for digital signals.
- Heavy duty digital I/O lines source 24 mA and sink 48 mA.
- Available Starter Kit and SDK for custom firmware.

### 4813H

#### IEEE-488.2 to Parallel Digital Interface



Two 4813 board set controls 256 parallel I/O lines from one GPIB address.

- Both boards have 4813 style 150-pin parallel I/O connectors.
- Includes flat-ribbon interconnection cable.

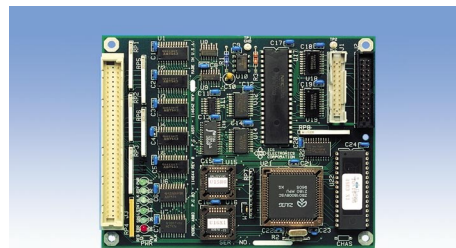
### 115640

#### 4813 Relay Driver Board

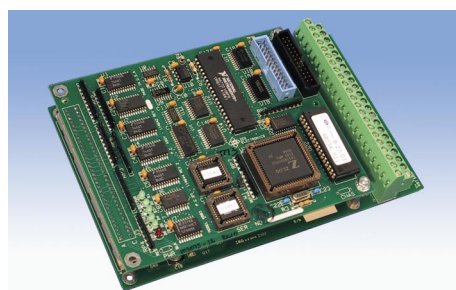


Provides 128 heavy duty 300 mA relay drivers for standard 2313, 4813 or 8013 boards.

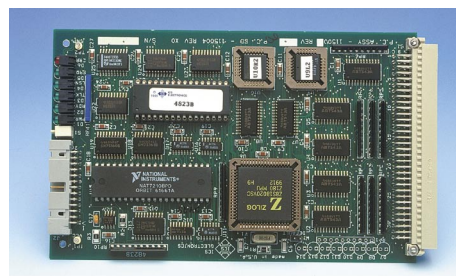
- Up to 32 lines for standard TTL I/O use.
- Relay lines on four 36-pin flat-ribbon cable headers.
- 12-32 Vdc input. Internal supply provides 5 Vdc for xx13 boards.



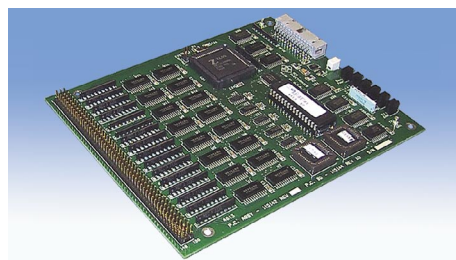
4803 IEEE-488.2 to Digital Interface Card



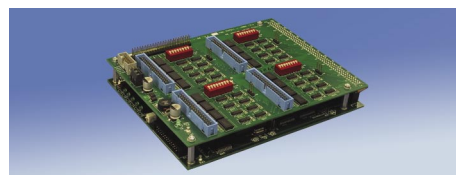
4803 Relay Driver Board with 4803 Interface Card



4823B IEEE-488.2 to Digital Interface Card



4813 IEEE-488.2 to Digital Interface Card



4813 Relay Driver Board on a 4813

Accessory cables and connectors are shown on pages 17-19.

For more information, call 1-800-952-4499 or visit [www.icselect.com](http://www.icselect.com)



# GPIB - Serial Interface Cards

## Cost effective solutions for interfacing virtually any serial device to the GPIB bus

ICS's GPIB-to-Serial Interface Cards are flexible enough to satisfy most OEMs yet are easy enough to use for individual applications. All of ICS's GPIB-to-Serial Interface Cards are IEEE-488.2 compatible and have GPIB settable parameters that configure the card to the user's application. Most have programmable IDN messages that personalize the card with the user's company name and model number.

The 4804B boards transparently pass messages between the GPIB bus and the serial device. The 4804B uses a Device Trigger escape sequence to switch to its command sub-mode where the user can set its serial and GPIB configuration.

The 4806, 4808 and 4816 have the capability to respond to 488.2 queries for the serial device. They do this by responding to all IEEE-488.2 common commands and to any GPIB messages starting with four reserved keywords: System, Status, Diagnostic and Calibrate. All other GPIB messages are passed on to the serial device. All serial device responses are returned to the GPIB bus.

OEM Starter Kits and Software Development Kits (SDKs) are available for the GPIB-to-Serial cards. ICS's Interface Cards save the OEM several man-months of development time and help bring the product to market earlier. Secondly with their low cost, they continue saving over the life of the product.

### *GPIB to Serial Interface cards*

#### **4804B IEEE-488.2 to Serial Interface** ✓

Provides a GPIB interface for devices with RS-232 or RS-485 serial interfaces or controls a single GPIB device. Uses Device Trigger to escape to Command sub-mode.

- 100% transparent GPIB-to-Serial conversion. Use for binary and ASCII data.
- GPIB settings and serial configuration set by SCPI commands and saved in Flash.
- GPIB Address set by SCPI or serial commands or by an external address switch.
- Supports handshaking, X-on/X-off protocol and data rates up to 38.4 Kbaud.
- Runs on 5 Vdc or unregulated 5.5 to 15 Vdc.
- Mates with ICS's GPIB Connector/Switch Boards or ICS's GPIB extension cable.
- Available Starter Kit, P/N 115561.

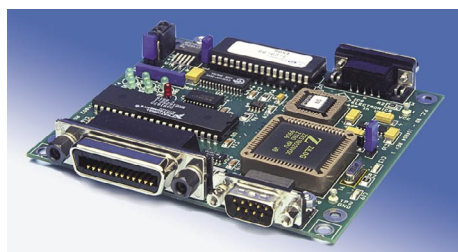


*4804B IEEE-488.2 to Serial Interface*

#### **4806 IEEE-488.2 and RS-232 to RS-232 Interface** ✓

Adds a smart IEEE-488.2 and serial interface to devices with an RS-232 serial interface. Transparent GPIB-to-Serial conversion less 488.2 commands and SCPI setup commands.

- Automatically handles all 488.2 commands and SCPI setup commands. Passes all other commands onto the internal serial device.
- Multiple modes for handling asynchronous, normal or smart serial devices.
- Smart mode allows embedded controller to modify Status bits and generate SRQs.
- GPIB address, IDN and serial settings set and saved by SCPI or serial commands.
- Supports handshaking, X-on/X-off protocol and rates up to 57.6 Kbaud.
- Easy to install board with right angle connectors mounts on rear panel.



*4806 and 4808  
IEEE-488.2 and Serial to Serial Interface*

#### **4808 IEEE-488.2 and RS-232 to RS-485 Interface** ✓

Same as 4806 board described above except drives RS-485 Modbus RTU device(s).

- Provides GPIB to Modbus RTU conversion for RS-485 Modbus device(s).
- Includes rear panel RS-232 to internal RS-485 conversion.
- Easy to install board with right angle connectors mounts on rear panel.

#### **4816 IEEE-488.2 to Serial Interface** ✓

Adds a smart IEEE-488.2 interface to devices with RS-232 or RS-485 serial interfaces.

Transparent GPIB-to-Serial conversion less 488.2 commands and SCPI setup commands.

- Automatically handles all 488.2 commands and SCPI setup commands. Passes all other commands onto the internal serial device.
- Multiple modes for handling asynchronous, normal or smart serial devices.
- Smart mode allows embedded controller to modify settings and Status bits.
- GPIB settings, IDN and serial settings set and saved by SCPI or serial commands.
- GPIB address set by SCPI or serial commands or by an external address switch.
- Supports handshaking, X-on/X-off protocol and data rates up to 57.6 Kbaud.
- Mates with ICS's GPIB Connector/Switch Boards.



*4816 IEEE-488.2 to Serial Interface*

# Serial Interface Modules and Boards

ICS's Serial Miniboxes and Serial OEM Boards are IEEE-488.2 compatible and provide GPIB functionality over an RS-232 link or on an RS-422/RS-485 network.

The 236x series Miniboxes include analog, digital, relay contact closures and relay driver interfaces that can be controlled over a serial link. Each 236x series Minibox™ gives the user a choice of an DCE type, RS-232 interface for direct connection to a PC's COM port or an RS-485 serial interface for a direct connection or for a network connection. Up to sixteen Miniboxes can be operated on a single network. All Miniboxes are available in board only form for installation in your own chassis.

The 2303 and 2313 Serial OEM boards are serial versions of the 4803 and 4813 GPIB-to-Parallel Interface Cards. They are physically similar and have the same digital interfaces. OEM users can change from GPIB to RS-232 or RS-422/RS-485 interfaces by just changing board types.

The 2307 and 2367 Data Acquisition cards with serial interfaces are shown on page 11. Accessory cables and connectors are shown on page 19.

## Serial Interface Modules

NEW!

### 2361B

#### Serial to Analog Interface

Provides analog and digital signals to control analog devices and reads voltages and monitors digital signals for feedback information.

- Two or four isolated analog outputs with  $\pm 10$ ,  $\pm 5$  or 0 to +10 volt ranges.
- Four differential analog inputs with ranges of 0.1, 1 or 10 volts.
- Four high current relay driver outputs sink up to 300 mA.
- Eight digital inputs for reading or monitoring external digital signals.
- RS-232 and RS-485 asynchronous Interfaces.



2361B Serial to Analog Interface

### 2363

#### Serial to Parallel (Digital) Interface

Provides 48 digital I/O lines for transferring parallel BCD/HEX or Binary data to or from the serial link.

- Powerful configuration commands let the user configure the parallel interface in 8 bit bytes to match his needs.
- Configuration saved in Flash memory.
- Output signals held in latches, pullup resistors provided for input signals.
- Digital data transfer as bytes or as data strings.
- Monitors up to 15 inputs.
- Generates Service Request Message (SRM) on data changes or when data ready.
- RS-232 and RS-485 asynchronous Interfaces.



2363 Serial to Parallel Interface

### 2364

#### Serial to Relay Output

Provides relay contacts or driver outputs for controlling, scanning, or switching signals over a serial link.

- Choice of 16 form 'A' low level or hi-current contacts or relay driver outputs.
- Operate relays individually, as a 1 to 8 pole scanner or in a preset sequence.
- 8 isolated digital inputs can be read or monitored for changes.
- Generates Service Request Message (SRM) on data changes.
- RS-232 and RS-485 asynchronous Interfaces.
- Available companion Terminal Board Assembly.



2364 Serial to Relay Interface

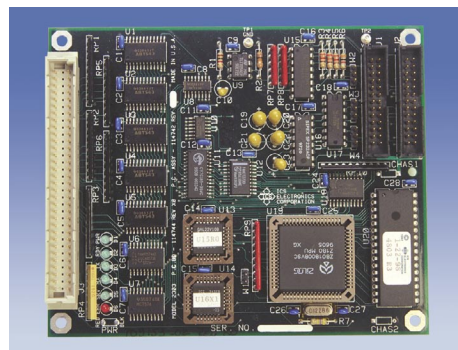
### 2303

#### Serial to Parallel (Digital) Interface

Provides a serial interface to control devices with 40 parallel digital signals.

Small 4.5 in. x 5.5 in. board runs on single 5 Vdc power.

- Same 40 line digital interface and board size as 4803. Use with 4803 Relay Driver Bd.
- User selectable RS-232, RS-422 or RS-485 serial interface.
- Control up to sixteen 2303s on a single RS-485 network.
- Interface configuration, address and user IDN message saved in Flash.
- Mates with ICS's Serial Connector/Switch boards or with a DB-25 serial connector.



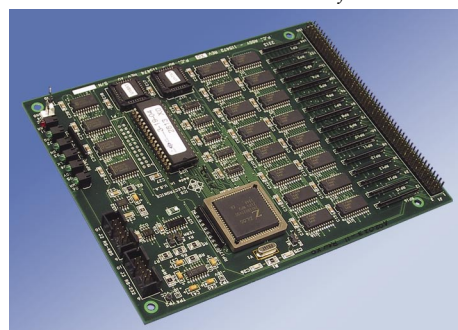
2303 Serial to Parallel Interface

### 2313

#### Serial to Parallel (Digital) Interface

Provides a serial interface to control devices with 128 parallel digital signals.

- Same 128 line digital interface and board size as 4813. Use with 4813 Relay Driver Bd.
- User selectable RS-232, RS-422 or RS-485 serial interface on 10 pin headers.
- Control up to sixteen 2313s on a single RS-485 network.
- Interface configuration, address and user IDN message saved in Flash.
- Runs on single 5 Vdc power.



2313 Serial to Parallel Interface

Accessory cables and connectors shown on pages 17-19.

For more information, call 1-800-952-4499 or visit [www.icselect.com](http://www.icselect.com)



# Interfaces and Prototyping Kits

ICS's proven VXI Interface is designed to make it easy for the new or occasional VXI user to build a special module or to quickly adapt an existing product to the VXIbus.

ICS's VXI interface boards occupy the first few inches of the module's board space along the VXI backplane and include the VXIbus P1 and P2 connectors. The user's circuit board occupies the front portion of the module and plugs into the interface board to make a complete C-size VXI module. ICS's VXI kits provide the front panels, side shields and necessary hardware to complete the module.

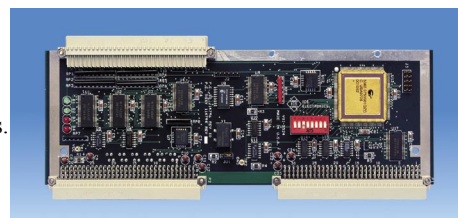
The VXI-5524 is a register-based VXI interface with 16 register addresses. Three registers are on the VXI-5524 card and provide 48 I/O lines. A 16-bit VXI expansion bus drives the user's circuits.

## VXI Interfaces and Prototyping Boards

### VXI-5524 Interface Card

Register based VXIbus interface board couples user's circuit board to the VXIbus.

- Provides a 48 line parallel I/O interface and a 16-bit expansion bus to drive user's logic.
- 48 line parallel interface can be configured as inputs or latched outputs in 16-bit increments.
- Choice of 1, 2 or 3 slot wide VXI hardware kits to enclose the completed assembly.
- Free design aids include PCB layout drawing files and ORCAD design templates.



VXI-5524 Interface Card

### VXI-5501/5502 Prototyping Module Kits

C-sized VXI prototyping modules using the VXI-5524 Interface Card.

- Both kits include the VXI-5524 VXI Interface Card with programmable I/O lines, side shields, a blank front panel and all necessary hardware.
- VXI-5501 kit has copper clad prototyping area for mounting RF and microwave modules.
- VXI-5502 kit has a sea-of-holes prototyping area with internal power planes. Holes are on 0.1 inch centers for mounting components, sockets, etc.
- One-slot wide module standard, two or three-slot wide kits also available.



VXI-5502 Prototyping Module  
(with sea-of-holes prototype board)

### 114824/114830 VXI-5524 Prototype Boards

Prototyping boards attach to the VXI-5524 Interface Card to form a complete VXI module.

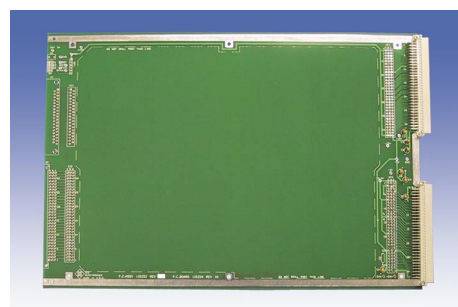
Select from two board styles:

- Sea-of-holes board has holes on 0.1 inch centers with multiple power and ground planes.
- Two-sided copper clad board ideal for microwave and high-frequency breadboarding.
- Both boards include mating connector, front panel LEDs and Reset button.

### 115250 Blank C-size Board

Blank C-size board for mounting extra devices, modules or other items in a VXI system.

- Connection pads with noise suppression capacitors on all VXI voltages.
- Pad patterns to pick up VXIbus signals from P1 & P2 connectors.
- Front panel pad patterns for connectors, LEDs and a Reset button.
- Blank board fits in the ICS VXI Kits on page 16.



VXI Blank Board

**VXI bus Shield Kits and Front Panels are shown on page 16.**



# Module Shield Kits

Start with a Prototyping Kit or go straight to a first article module using our layout aids. ICS has the widest selection of VXI Module Shield Kits and Front Panel Kits available for your VXI module.

ICS's C-size VXI and VXI4 Module Shield Kits are available in one, two and three slot widths. Each kit includes a front panel, side shields, ejectors, and all of the necessary hardware to assemble the completed module. The front panel is blank except for the ejector slots and mounting holes. The side shields have air vents and an address switch opening. ICS's clam-shell design includes several RFI limiting features including RFI gaskets, connector shield skirts and air slots designed to attenuate frequencies below 2 GHz. ICS's VXI kit design has been proven by numerous modules that have passed the CE RFI emissions and noise susceptibility tests. Each VXI kit includes a complete set of assembly instructions and layout drawings. Front panel kits are available for each module style and width.

ICS now offers single-slot wide ITC style kits for slotted PCBs. These kits match the original Interface Technology design.

ICS supplies designers with module design aids such as ORCAD templates for schematics, PCB layouts and AutoCad DXF files for creating your front panel machining drawing.

ICS also provides custom VXI kits based on your design drawings. The custom kits can include machined and painted front panels and modified side shields when required. This one stop shopping means less overhead for you and saves the time and cost of shipping parts between multiple vendors.

## VXI Module Shield Kits

**NEW!**

### VXI4-KITS

### C-size Module Shield Kits, VXI-4.0

Single and dual slot, C-size, VXI module shield kits for VXI modules with VXI-4.0 150-pin or 96-pin connectors.

- Includes blank front panel, side panels, ejectors and all kit hardware.
- Low weight aluminum construction, full RFI gaskets and generous air vents.
- Dual-slot units have extra space on component side of main PC board.
- Documentation includes front panel and PCB layout drawings, ORCAD PCB design templates and AutoCad DXF CAD files.

### VXI-KITS

### C-size Module Shield Kits

Single, dual and three slot, C-size, VXI module shield kits for modules with 96-pin connectors. Kits are available in two mounting screw patterns and address switch locations.

- Includes blank front panel, side panels, ejectors and all kit hardware.
- Low weight aluminum construction, full RFI gaskets and generous air vents.
- Dual-slot units available with extra space on either side of main PC board.
- Triple-slot unit with extra spaces on component side of main PC board.
- Optional kits available with no address switch or mounting screw holes.
- Documentation includes front panel and PCB layout drawings, ORCAD PCB design templates and AutoCad DXF CAD files.

### VXI-KIT

### Two Board C-size Module Shield Kits

Two board, dual slot, C-size VXI module kit for modules with 96-pin connectors.

- Includes blank front panel, side and center shields, ejectors and all kit hardware.
- Four VXIbus connectors provide 2 x power inputs of a single board module.
- Low weight aluminum construction, full RFI gaskets and generous air vents.
- Documentation includes front panel and PCB layout drawings, ORCAD PCB design templates and AutoCad DXF CAD files.

**NEW!**

### VXI-KITS

### ITC Style C-size Module Shield Kits

Single slot, C-size, VXI module shield kits built to house Interface Technology style boards with tabs on long sides. Matches ITC's original design.

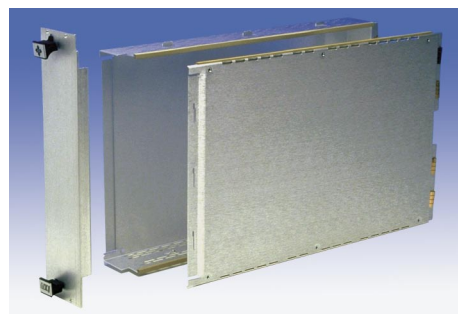
- Includes blank front panel, side panels, ejectors and all kit hardware.
- Low weight aluminum construction and generous air vents.
- Documentation includes front panel and PCB layout drawings, ORCAD PCB design templates and AutoCad DXF CAD files.

### Front Panels

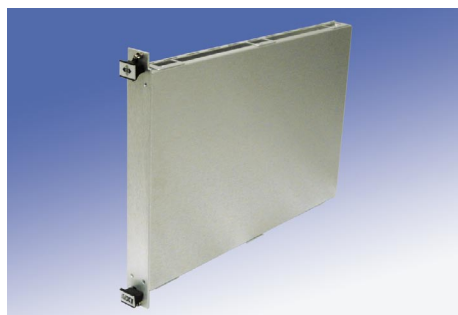
### Front Panel Kits

Front panel kits are available for all of the modules listed above.

- Includes ejectors and all mounting hardware.
- Includes layout and machining documentation.



VXI-KIT  
(Dual wide version shown above)



ITC style VXI KIT



Front panel Kit (Single Wide)

VXI bus Interface Cards are shown on page 15.

For more information, call 1-800-952-4499 or visit [www.icselect.com](http://www.icselect.com)



# Accessories and Rack Mounting Kits

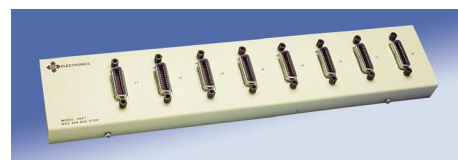
## Cables & Bus Strip™

### 4801

### Bus Strip™

IEEE-488 Bus distribution panel that eliminates GPIB cable routing problems. Mounts in rear of 19 inch side rack or on a bench. Includes benchtop or rack mounting brackets.

- Eight connectors eliminates hanging multiple cables on an instrument.
- Low capacitance counts as less than 0.5 m against the 20.0 meter bus limit.



4801 Bus Strip

### GPIB Bus Cables with Double-Ended Connectors

High quality multiple shielded cables with metal connector hoods.

- Proven superior shielding in RFI/EMI tests.
- Standard lengths of 0.5, 1, 2, 2.5, 3 and 4 meters
- Double-ended connectors can be used to create star or serial cable topographies.
- Custom lengths up to 20 meters long.

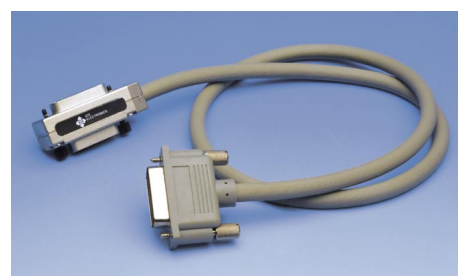


GPIB Bus Cable with double-ended connectors

### GPIB Bus Cables with a Straight-in Connector

High quality multiple shielded cables with metal connector hoods.

- Straight in connectors ideal for connecting to PCs and avoiding sharp bend radius.
- Proven superior shielding in RFI/EMI tests.
- Standard lengths of 0.5, 1, 2, 2.5 and 4 meters.
- Custom lengths up to 20 meters long.



GPIB Bus Cable with straight connector

### 114508

### 4863 Digital I/O Cable

Open End, 62-conductor, five foot long cable.

- Shielded round cable with AWG 28 colored wires.

### 112829-01

### 4864 Relay I/O Cable

Open end, 50 conductor, five foot long cable.

- Shielded round cable with AWG 26 colored wires.

### GPIB Metric Studs

Mounts GPIB Connector to rear panel of host chassis or instrument. Has metric female threads that mate with the GPIB Cable jack screws.

- P/N 490001 has standard 4.5 mm long shank.
- P/N 490063 has extra long 7.1 mm shank.



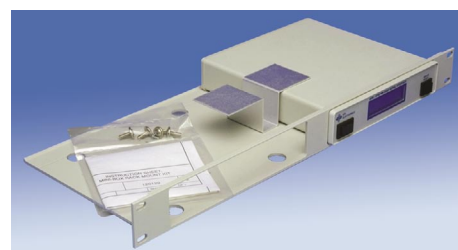
Metric studs

## Rack Mount Kits and Accessories

### Minibox™ Rack Mounting Kits

Holds all ICS Minibox™ products.

- Rack mount kits available for any combination of 1 or 2 large and/or small Miniboxes.
- Mounts one or two Minibox™ interfaces in a 1.75 inch high (1 U high) space.
- Uses only 8 inches of depth behind panel.
- Metal bracket holds units in rack mounting kit.



Minibox™ Dual Rack Mounting Kit

### Standard Unit Rack Mounting Kits

Holds all ICS 3.5 inch high, half-rack wide box products.

- Mounts two units in a 3.5 inch high (2 U high) rack space.
- Single rack mount kits include filler front panel to cover the unused side.

### Minibox™ Power Adapters

Provides regulated or unregulated DC power for the Minibox™ products.

- 115 VAC model with US plug standard. (Lefthand adapter in photo)
- New Universal 115/230 VAC model with US, UK, European and Australian/China power plugs for international customers. (Righthand adapter in photo)
- Refer to the application-country chart listed on the Power Adapter Data Sheet to select the appropriate adapter for your Interface and country.



US and Universal Plug Power Adapters

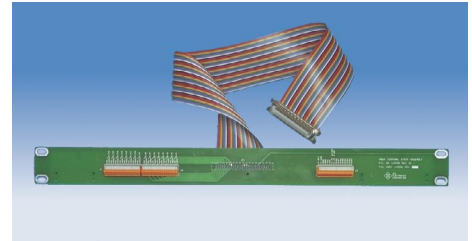
# Terminal Boards and Relay Driver Boards

## Terminal Boards

### 114534 4864 Rack Mounted Terminal Strip

Provides quick connect terminals for all 2364, 4864 and 8064 relay contacts and digital inputs. Mounts across the rear rails of a 19 inch wide equipment rack.

- Lever actuated installation displacement terminals accept 28 to 20 AWG wire.
- 19 inch x 1.75 inch board mounts to the front or rear rails of a 19 inch rack.
- Standard flat ribbon cable is 60 cm. Order as P/N 114534-60.
- Other flat ribbon cable lengths available on special order.

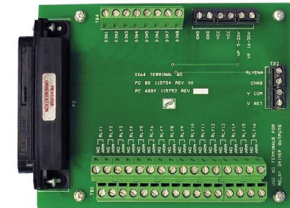


Rack Mounted Terminal Board Assembly

### 115750 2364/4864/8064 Terminal Board

Provides screw terminals for all 2364, 4864 and 8064 relay contacts and digital inputs.

- Screw terminals accept 28 to 20 AWG wire.
- Small 4 inch x 5 inch board plugs into back of a xx64 board.
- Use with contact closures or with relay driver outputs.

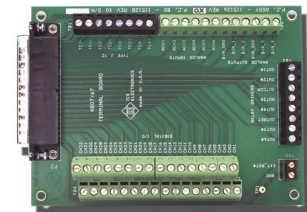


2364, 4864 and 8064 Terminal Board

### 115124 23x7/48x7 DAQ Terminal Board

Provides screw terminals for all 2307, 4807, 2367 and 4867 signals.

- Screw terminals accept 28 to 20 AWG wire.
- Small 4 inch x 5 inch board plugs into back of any xxx7 board or Minibox™.
- May even be used with thermocouple wire.



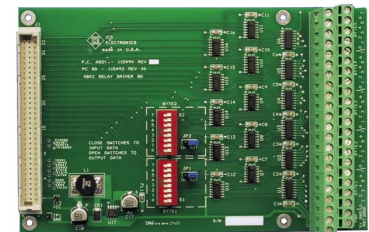
2307/4807 DAQ Terminal Board

## Relay Driver Boards

### 115490 2303/4803 Relay Driver Board

Provides 40 heavy duty 300 mA relay drivers for 2303 or 4803 boards with circuit side connector.

- User configurable as 24, 32 or 40 Relay Drivers that sink up to 300 mA each.
- Use 8 or 16 lines as standard TTL I/O lines.
- Convenient screw terminals for relay, digital I/O signals and power connections.
- Uses 12 to 32 Vdc relay power.
- On card power supply provides 5 Vdc for 2303 or 4803 board.

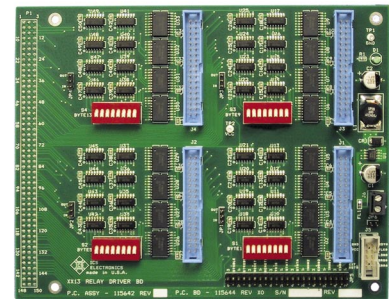


2303/4803 Relay Driver Board

### 115640 4813 Relay Driver Board

Provides 128 heavy duty relay drivers for standard 2313, 4813 or 8013 boards.

- Mounts on top of standard 2313, 4813 and 8013 boards.
- Provides 128 relay drivers that sink up to 500 mA each.
- Up to 32 lines can be used as standard xx13 I/O lines.
- I/O signals are on four 36-pin flat-ribbon cable headers.
- Accepts 12 to 32 Vdc relay power and supplies 5 Vdc to the xx13 board.
- Use with 115656 Cables and mating 902332 PCB header.



4813 Relay Driver Board

### 115650 4813 Connector Board

Converts 2313, 4813 or 8013's 150-pin connector into four headers for flat ribbon cables.

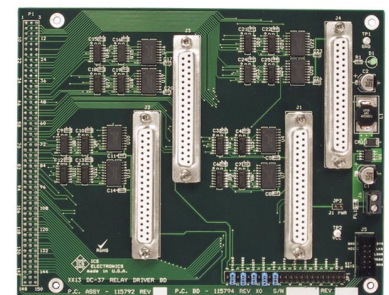
- Flat-ribbon cables simplify your wiring.
- Each header has 32 xx13 TTL I/O lines plus power and ground.
- Short version of the 115640 board without the Relay Drivers.
- Use with 115656 Cables and mating 902332 PCB header.



### 115790 DC-37 Relay Driver Board

Provides 64 heavy duty relay drivers for standard 2313, 4813 or 8013 boards.

- Mounts on top of standard 2313, 4813 and 8013 boards.
- Provides 64 relay drivers that sink up to 500 mA each.
- Provides 64 lines xx13 type TTL I/O lines.
- I/O signals are on four DC-37 male connectors.
- Accepts 12 to 32 Vdc relay power and supplies 5 Vdc to the xx13 board.



DC-37 Relay Driver Board

For more information, call 1-800-952-4499 or visit [www.icselect.com](http://www.icselect.com)

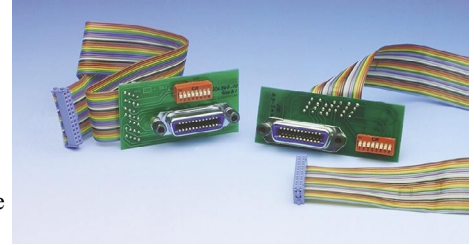
# Board Accessories and Connectors

## Connecting Cables

### ✓ GPIB Connector/Switch Board Assemblies

Small business card size assemblies with a flat ribbon cable that extends GPIB bus and address switch signals to the rear panel.

- Use with 4803, 4804B, 4807, 4809, 4813, 4816, 4823B, 4861B, 4863, and 4864 cards.
- Includes metric studs that fasten the GPIB connector and the GPIB Address Switch to the rear panel.
- Available in two PCB layouts with user specified cable lengths up to 90 cm.

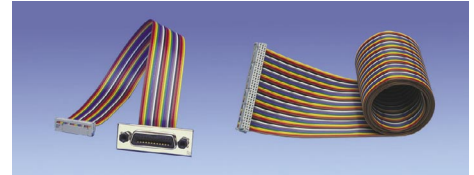


GPIB Connector/Address Switch Assemblies  
(Vertical style on left, horizontal on right)

### 114439-L GPIB Flat Ribbon Cable ✓

Panel mounted GPIB connector with a flat ribbon cable that extends GPIB signals from the chassis rear panel to the Interface Card. Cable lengths (L) up to 90 cm.

- Plugs into the GPIB signal header on the 4803, 4804B, 4809 and 4816 cards.
- Includes metric studs that fasten the GPIB Connector to the rear panel.



Left - GPIB Flat Ribbon Cable  
Right - Open-end Digital I/O Cable

### 112343 4803/2303 Digital I/O Cable

Open-end, 5 foot long rainbow colored cable extends 4803 & 2303 digital I/O signals.

- Plugs in to the 2303 and 4803's parallel I/O connector.
- Wires to your mating connector.

### 114508 4863 Open End Cable ✓

Open-end, 5 foot long cable extends 4863's digital I/O signals. Wire to your connector.

### 114256-L Serial Flat Ribbon cable ✓

Panel mounted DB-25P connector with a flat ribbon cable that extends the Serial signals from the 2303 Interface Card to the rear panel. Cable lengths (L) up to 90 cm.

- Includes lock studs that fasten the Serial Connector to the rear panel.



Serial Flat Ribbon Cable

### 114597 Serial Cable Kit

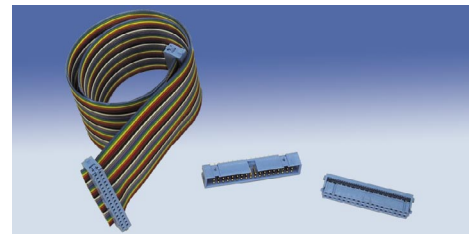
Kit for building a cable that extends the serial signals from the Serial Header on 2361, 2363 and 2364 series Board Assemblies to the rear panel of the host chassis.

- Kit includes header plug, pins, DB-25S connector, lock studs and wiring directions.

### 115656-L Digital Flat Ribbon cable ✓

36-conductor Flat Ribbon Cable for 4813 Relay Driver Board and 4813 Connector Board.

- Cable Lengths from 10 to 90 cm.
- Use 902332 male header for your PC board.
- Use 902334 female flat-ribbon connector to make your own flat-ribbon cables.



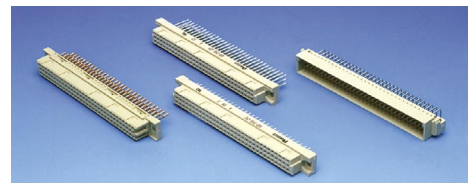
115656 Flat Ribbon Cable, 902332 Header and  
902334 Flat-ribbon Connector

## Mating Connectors

### 902023, 24, 25 and 26 Mating DIN connectors ✓

96-pin DIN connectors with a variety of terminal styles. For use with 2303, 4803, and 4823B boards.

- P/N 902023 is a 96-pin DIN with solder eyelets.
- P/N 902025 is a 96-pin DIN with dip solder pins.
- P/N 902026 is a 96-pin DIN with rightangle pins for VXI-5524 and VXI-5526.



Mating DIN Connectors - from left to right  
eyelet, dip solder, wirewrap, and right-angle pins

### 902308 Mating 150-Pin connector ✓

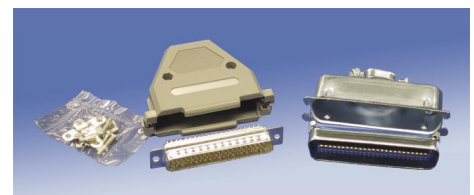
150-pin mating connector for 4813 interface card. 3 rows x 50 pins/row on 0.2 inch centers.



Mating 4813 Connector with solder pins

### 902270 Mating 62-Pin connector ✓

62-pin high density DC shell mating connector with solder sockets. Used with 2307 and 4807 boards and with 2367, 4863 and 4867 Miniboxes. Order 902105 hood separately.



Mating 62-pin DC shell connector on left  
Mating 50-pin blue ribbon connector on right

### 902002 Mating 50-Pin connector ✓

50-pin blue ribbon mating connector with solder sockets and hood. For use with 2364 and 4864 Miniboxes.

✓ Product is available as RoHS compliant; ✗ Product is being converted to RoHS.  
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For more information, call 1-800-952-4499 or visit [www.icselect.com](http://www.icselect.com)



ADDRESS SERVICE REQUESTED

## Distributors and Sales Representative Locations



ICS has Sales Representatives (main offices shown by red dots) in the United States and Distributors (main offices shown by blue dots) throughout much of the world. Current Distributor and Sales Representative phone numbers are available on ICS's website at <http://www.icselect.com/>. If you are located in a country without a distributor, contact ICS Electronics directly at [icssales@icselect.com](mailto:icssales@icselect.com).

ICS Electronics accepts purchase orders on approved credit or with an American Express, Discover, Mastercard or VISA card. Minimum order is \$50. If payment is made by a check, the check must be drawn on a US bank. Wire transfers must be in US dollars. Minimum wire transfer is \$750.

All ICS products are warranted for a minimum of one year unless otherwise agreed upon. Shipments are FOB Pleasanton, California, USA. Minimum shipping charge is \$7.00. Published prices and availability subject to change without notice.

**For more information, call 1.800.952.4499 or visit [www.icselect.com](http://www.icselect.com)**



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