

GPIB LAN INTERFACE

4865B

GPIB-to-LAN Instrument Interface

DESCRIPTION

ICS's 4865B is a GPIB-to-LAN Instrument Interface that enables instruments with an Ethernet interface to be controlled from a GPIB Bus. Using the 4865B, GPIB applications can transparently connect to and control a LAN-based instrument just as if it were a GPIB Instrument. The 4865B handles both VXI-11 compatible instruments and instruments that use raw socket (TCP/IP) protocol. Data transfer is bi-directional.

The 4865B solves the problem of how to interface an instrument with an Ethernet interface to the GPIB bus. Applications include replacing obsolete or failed GPIB instruments with a newer instrument that may not have a GPIB interface or just adding a new LAN instrument to a GPIB bus system. Several OEM board versions are available that can be housed inside larger instruments.

The 4865B adds an IEEE-488.2 compliant, GPIB interface to a VXI-11.3 compatible instrument. IEEE-488.2 compliance for LXI and raw socket instruments is determined by the instrument's command capability.

Linking to the Instrument

The 4865B automatically finds the instrument if the instrument is VXI-11 compatible, or is a LXI instrument or is an instrument that can perform the LXI 'VXI-11 Discovery' process. AutoFind can be used with a 'Static' IP or with the 'DHCP with AutoIP' setting when the 4865B is directly connected to the instrument.

If AutoFind is enabled, the 4865B starts the instrument discovery process as soon as it completes its power turn-on and self-test sequence. When the 4865B finds an instru-



4865B GPIB-to-LAN Interface

ment that responds to the VXI-11 Discovery process, the 4865B uses that IP address for the instrument.

If the 4865B has been given a specific IP address, the 4865B only looks for an instrument at that address. Fixed IP addresses are recommended when the 4865B to instrument connection is over the company network, when multiple instruments may respond to the 4865B or for raw socket communication.

VXI-11 Instruments

For VXI-11 compatible instruments, the 4865B converts 488.1 GPIB commands into the equivalent VXI-11 RPC and sends them to the instrument. Device messages are transparently sent to the instrument and instrument replies are returned to the GPIB Controller, just like a GPIB instrument. The 4865B performs a background check of the instrument's Status Register with the '*STB?' query to create a virtual Status Byte Register and asserts an SRQ on the GPIB bus when a Service Request is detected.

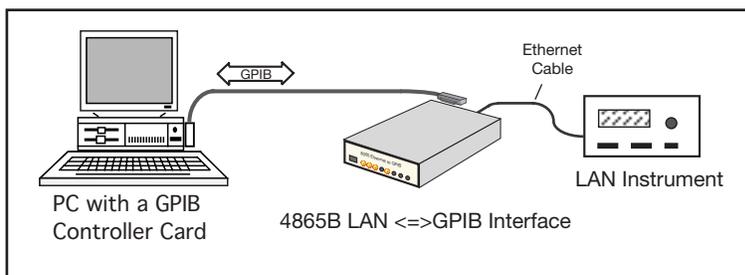


Figure 1 4865B connects a LAN Instrument to the GPIB Bus

- Adapts LAN instruments for GPIB Test Systems.
Expands the number of instruments that will work in your GPIB test system.
- Transparently passes all commands to the companion LAN instrument.
Runs from any GPIB system.
- AutoFind feature simplifies instrument linkage.
Eliminates hunting and setting/changing IP addresses.
- Supports VXI-11 and raw socket communication.
Works with most LAN instruments.
- Saves instrument replacement costs and helps reuse existing test software.
Passes GPIB commands onto the LAN instrument.
- Easy configuration from any web browser
Internal webserver with Welcome and Configuration pages
- Drop-in replacement for the original 4865.
Faster data transfer with a faster processor.

CE Approved

RoHS Construction

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Raw Socket Instruments

For instruments that use raw socket protocol, the 4865B transparently transmits GPIB device messages to the instrument. Instrument responses are received from the instrument and outputted to the GPIB Controller when the 4865B is addressed to talk. The 4865B can be set to use a specific raw socket port number, to recognize an EOS character to terminate the instrument responses and to test the instrument's IDN response. If the instrument supports the VXI-11 Discovery method, the 4865B can AutoFind it. The 4865B can also convert IEEE-488.1 GPIB Commands such as GET, SDC, etc. and GPIB events such as IFC or local/remote changes into a user specified command strings if the instrument has similar capabilities. If SRQs and Serial Polls are enabled, the 4865B performs a background check of the instrument's Status Register with the *STB? query to create a virtual Status Byte Register and asserts an SRQ on the GPIB bus when a Service Request is detected.

Minimal Programming Changes

In most cases, existing programs that run the new Ethernet version or the older GPIB version of the instrument can be used with the 4865B and the new instrument. The only requirement is that the new instrument must understand the existing commands. The 4865B works with any IEEE-488.2 compatible GPIB controller and can be used with LabVIEW, VEE, Visual Basic and C language programs. The 4865B and VXI-11.3 instrument combination supports most 488.1 GPIB commands except for Remote with Lockout and Local with Lockout.

When used with a raw socket instrument, the combination will have reduced GPIB capability that can be augmented when configuring the 4865B. Depending upon the instrument's capability, the user can enable AutoFind, IDN queries, IDN confirmation, SRQ generation and Serial Polling. The 4865B can also be set to send the instrument substitute command strings for Device Trigger, Device Clear, GTL, Local/Remote changes, IFC received and power turn-on or reset.

Connections

While the 4865B is normally used in a back-to-back connection with its companion instrument as shown in Figure 1, it can be connected to the instrument in other ways. Figure 2 shows the 4865B connected to the instrument through an Ethernet hub or switch. This is a typical lab bench connection. It lets a user configure the 4865B through the hub while developing the GPIB program.

The 4865B instrument connection can be expanded across the company network as shown in Figure 3 or further if the instrument is VXI-11 compatible. The 4865B provides standard GPIB control over the instrument no matter where it is located.

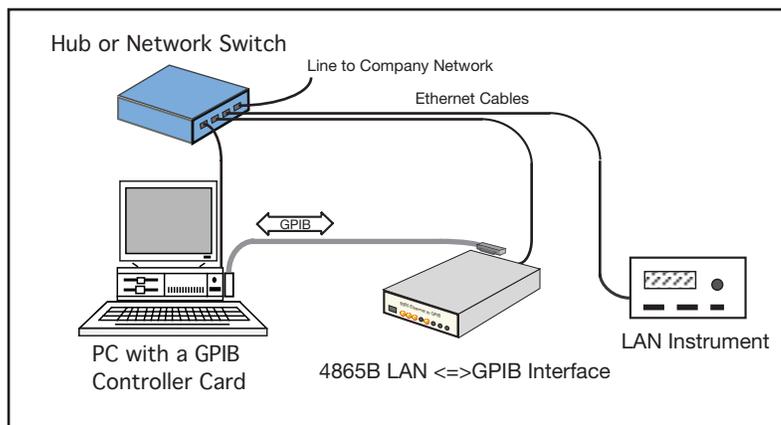


Figure 2 4865B Instrument Hub Connection

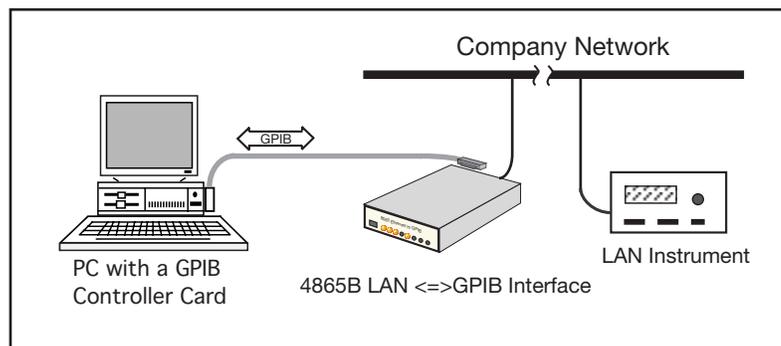


Figure 3 4865B Instrument Network Connection

Setup & Installation

The 4865B is very easy to install. Plug the 4865B into a network access point adjacent to your computer as shown in Figure 2 or use an Ethernet cable to connect the 4865B directly to a PC's network port. Launch a web browser and point it to the 4865B's default AutoIP address of 169.254.48.65. The 4865B's Welcome page provides all of the information about the 4865B's current settings. If the 4865B is being used with a VXI-11 compatible instrument that has an AutoIP address, no configuration is required.

Else, select the Configuration Page where you can select and set a static IP address or DHCP with AutoIP, change the 4865B's GPIB address, enable AutoFind or set a fixed IP address for the companion instrument, and select the instrument protocol (VXI-11 or raw socket). For raw socket instruments, you can enter strings that the instrument can respond to. The 4865B will send the strings to the instrument in place of GPIB Commands or events. For instance, the IEEE-488.2 *RST Common Command might be replaced with 'Reset'. Set the remaining parameters, save the settings, reboot and the 4865B is ready to be connected to the instrument and to the GPIB bus.

A rear panel LAN Reset button is provided to reset the 4865B's network settings to the factory default settings in case the 4865B's configuration needs to be reset.

4865B vs the original 4865

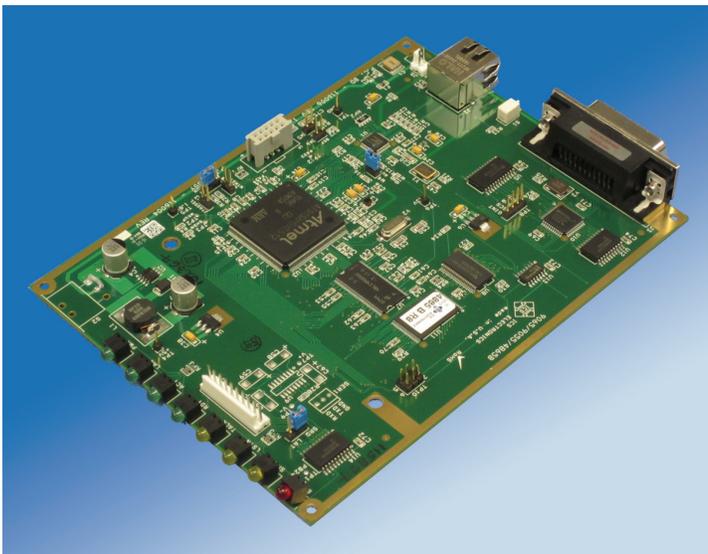
The 4865B has a faster processor and faster Ethernet interface than the original 4865. In addition, the 4865B adds support for raw socket instruments. The result is a 2.5x to 10x faster interface depending upon the command, the protocol and the companion instrument.

Rack Mounting

The standard 4865B is housed in ICS's small metal Minibox™ and is designed for benchtop use or rack mounted with an optional rack mount kit. The metal Minibox case provides superb EMI/RFI suppression. Rack mount kits are available that hold one or two small 4865Bs or a 4865B and an ICS interface in a large size Minibox™.



115895 OEM Board with 113644-15 Cable



115897 OEM Board

OEM Board Version

Several OEM Board versions of the 4865B are available for engineers who want to build the 4865B functionality into an instrument. The OEM boards differ in their connector options:

Part#	Description
115895	20-pin flat ribbon header for GPIB and horizontal RJ45 connector for Ethernet. Best version for mounting inside the chassis.
115897	Right-angle GPIB and RJ45 connectors.
115907	Right-angle GPIB and vertical RJ45 connector. Use when mounting the board against the rear panel so the GPIB connector protrudes thru the rear panel of the chassis.

All of the OEM boards have their power switch is removed and jumpered so that the board turns on with system power. The standard power jack is replaced by a two-pin friction-lock header with a retaining clip. The mating connector is ICS P/N 902323 (TE Connectivity part# 6440440-2). Four 2-56 x 0.25 inch threaded standoffs allow the board to be mounded against any metal plate with adequate clearance under the board.

Use a flat-ribbon GPIB cable like ICS P/N 113644 to extend the GPIB header on the 115895 OEM Board to the rear panel of the chassis. The 113644 cable includes metric studs for mounting the GPIB connector on the rear panel and can be ordered in any length from 10 to 90 cm.

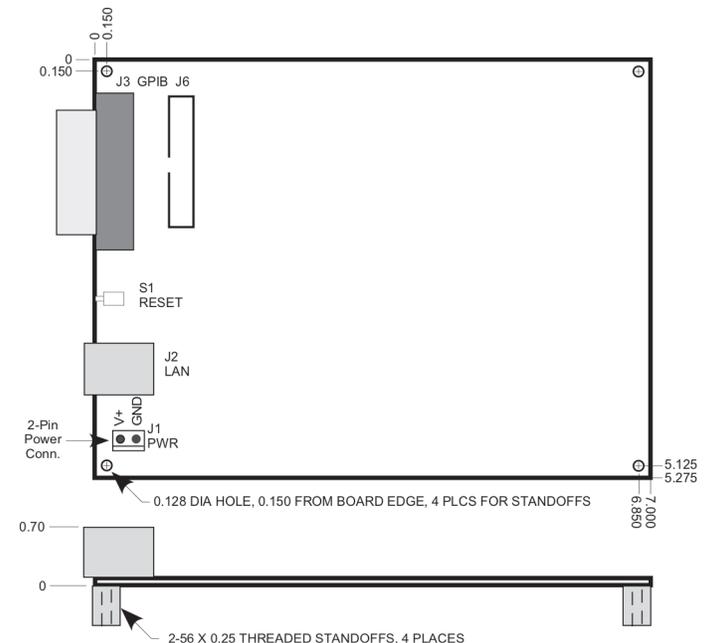


Figure 4 4865B OEM Board Outline Dimensions

4865B SPECIFICATIONS

Supported Standards

IEEE 488.1 Capabilities:

The 4865B's IEEE-488.1 capabilities are determined by the communication link to the instrument. For VXI-11 instruments they are:

AH1, SH1, T6, L4, SR1, RL2, PP0, DC1, DT1, C0 and E2

E2 Drivers incorporate power up/down protection.

4865B Address 0 to 30 [4]

488 Bus Performance

Long term GPIB transfer rates are limited by the LAN data transfer rate, the Client-computer performance, the GPIB controller and the LAN instrument or device. Internal delays vary with the amount of data transferred and 4865B's activity when the message was received.

Short term transfer rates:

GPIB to 4865B >260 kbyte/sec

4865B to GPIB >180 kbyte/sec

Command times:

*IDN? query 17 ms typical (VXI-11)

*IDN? query 3 ms typical (raw socket)

*CLS command 8.5 ms typical (VXI-11)

Supported GPIB (IEEE-488.1) Commands

Either converted into the equivalent VXI-11 rpc or replaced by a user designated string.

Device Clear

Device Trigger

Local

Remote

Serial Poll

VXI-11 Capabilities

Fully VXI-11.3 compliant

VXI-11.3 Client side

Channel types Data channel

Instrument links 64 max

Locking By instrument link

RPC Protocol

Conforms to ONC RPC Version 2

Ethernet Interface

Type IEEE 802.3 compliant
Auto-MDIX

Speeds 10BaseT (10 Mb/s)
100BaseT(100 Mb/s)

IP Address Static or DHCP (AutoIP)

Factory setting DHCP with AutoIP.
Defaults to 169.254.48.65 if
no DHCP server response.

Net Mask 255.255.0.0

Interface name inst0

VXI-11 timeout 150 ms to 3 seconds.

Companion Instrument

The 4865B supports a single instrument that is VXI-11.3 compatible or that uses raw sockets.

GPIB Controller Requirements

GPIB Controller needs to be IEEE-488.2 compliant. Device messages must be terminated with the IEEE-488.2 new line terminator (linefeed with EOI asserted) or with just EOI asserted if the LAN instrument does not require a terminator.

Computer with an IEEE 802.3 LAN interface and a web browser for configuring the 4865B.

Internal WebServer

The internal WebServer provides HTML web pages for viewing and setting the 4865B's configuration.

Controls and Indicators

CONTROLS

Power Front-panel switch

LAN Reset Rear-panel push-button

LEDs

PWR Power on
LAN Unit connected to an active network or network device.
ACT Transferring messages to/from the network.
RDY Blinks when looking for an instrument. Steady on when linked to an instrument
TALK 4865B is addressed to talk
LSTN 4865B is addressed to listen
SRQ 4865B asserting SRQ on the GPIB bus.
ERR Unit has detected an error

Physical

Size 7.45" L x 5.57" W x 1.52" H
(18.92 cm L x 14.15 cm W x 3.86 cm H)

Weight

Module 1.6 lbs. (0.73 kg.)
Shipping 3 lbs. (1.4 kg)

Construction RoHS Compliant

Temperature

Operating -10 °C to +65 °C
Storage -40 °C to +70 °C

Humidity 0-90% RH non-condensing

Shock/Vibration Normal handling

Connectors

GPIB GPIB 24 pin ribbon with metric studs.
Ethernet RJ-45

OEM Bd 2-pin friction lock header
Power A M P 6 4 0 4 5 6 - 2

Power 9 to 32 Vdc @ 4 VA

RFI/EMI CE Certified

EEC Standards EN 55024:2010
and EN 55022:2010

Construction RoHS with FR406 PC Bd
Reach compliant

Firmware Field upgradable

Included Accessories

Standard units include:

Instruction Manual

CD-ROM with support information.

LAN Crossover Cable.

UL/CSA/VDE approved 115/230±10% AC

Power Adapter provided with plugs for US,

UK, Europe, Japan, Australia and China

OEM Boards do not include accessories.

The VXI-11 Specification is available from the VXI Consortium at <http://www.vxibus.org/specs.html?q=node/206> or from ICS's website at http://www.icselect.com/vxi_spec.html

ORDERING INFORMATION

Part Number

GPIB to Lan (Ethernet) Instrument Interface with 115/230 VAC adapter, universal plug set, Manual and CD-ROM 4865B

GPIB to Lan (Ethernet) Instrument Interface OEM Board 115895, 115897 or 115907

GPIB Accessory Cables See separate data sheet

Rack Mounting Kits (holds one or two 4865Bs). See separate data sheet Single - 114210, Dual - 114211