

## Ethernet-to-GPIB Controller



### DESCRIPTION

ICS's 8065 is a Ethernet-to-GPIB Controller that lets you control your GPIB instruments over an in-house network or over the Internet. The 8065 makes it easy to run instruments at your workbench, to share test equipment with others or to run remote tests anywhere in the world over the internet. The 8065 connects to any TCP/IP 10BASE-T/100BASE-T network or to the NIC port on your computer.

The 8065 is a VXI-11 compliant network service which can be easily controlled by several programming techniques. ICS's VXI-11 Keyboard utility lets you find and control GPIB instruments connected to the 8065. The 8065 can also be controlled through VISA layers from Agilent, National Instruments, and other vendors. Unix and other operating system users can control the 8065 with RPC calls over a TCP/IP network.

### VXI-11 and VISA

The Model 8065 is a VXI-11 compliant Server. VXI-11 is a communication standard developed in conjunction with the VISA Specification. VISA layers provide programmers with a vendor independent API that can be called by their programs. Popular graphical test programs like LabVIEW and VEE as well as C language and Visual Basic programs can make VISA calls so they can be used with different vendors' GPIB Controllers. With VISA, instruments and controllers are considered as VISA resources. The same VISA program that ran a PCI or USB GPIB Controller can run the 8065 by changing the resource designation. When the user designates a TCP/IP resource like ICS's 8065, it is accessed through the VISA layer's VXI-11 interface.

### Programming

If you program with Agilent VEE or other Agilent programs, you can use Agilent's VISA or its internal SICL library to control ICS's 8065. The Model 8065 is fully VXI-11



**8065 Ethernet-to-GPIB Controller**

compliant and is often interchangeable with Agilent's E5810A and older E2050B if you are not using their RS-232 interfaces.

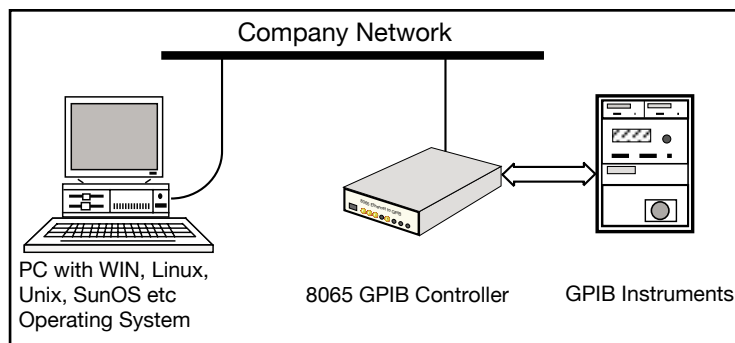
If you program with LabVIEW, National Instruments' VISA supports the 8065. NI's Measurement and Automation Explorer treats the 8065 as any other VXI-11 compliant device.

If you use a WIN32 operating system and are a Visual Basic or C/C++ programmer, you can write your program with RPC, SICL or VISA calls to control your GPIB instruments. RPC or SICL calls are recommended as they provide the complete VXI-11.2 capability lacking in most VISA libraries.

If you use Linux or any other flavor of Unix like SunOS, IBM-AIX, HP-UX, or Apple's OS X, you can communicate with the 8065 through either through RPC over TCP/IP or with VISA calls.

RPC (Remote Procedure Call) provides an invisible communication medium allowing the developer to concentrate on his program. The VXI-11 Specification, available at <http://www.vxibus.org>, includes the necessary RPCgen header files to generate the RPC calls. RPC calls can be used with virtually any operating system that has TCP/IP communication capability.

- Remote control of GPIB instruments via the Internet or in-house network.  
*Control GPIB and HP-IB Devices from anywhere.*
- Runs from any VXI-11 compliant VISA layer.  
*Supports Agilent VEE, NI LabVIEW, C/C++, and Visual Basic programs using VISA calls.*
- Easily controlled by RPC calls over TCP/IP.  
*Adds GPIB Controller capability to Unix, Linux, OS X, SunOS and similar systems.*
- Includes ICS's VXI-11 Keyboard Controller program for interactive control of GPIB devices.  
*Lets you try out commands and control instruments without writing a program.*
- Handles multiple clients.  
*Shares equipment among multiple users.*
- Eliminates GPIB Cable length restrictions.  
*Control GPIB equipment wherever you have an Ethernet connection.*



**Figure 1 8065 shown connected to Company Network**



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## Keyboard Controller Program

The 8065 includes ICS's VXI-11 Keyboard program for Windows which provides interactive control of GPIB devices from the computer keyboard without having to write a program. The VXI-11 Keyboard program is the ideal utility program for testing the 8065 Controller, for exercising GPIB devices or for trying out device commands before using them in a program.

With the VXI-11 Keyboard program you can find and link to your 8065s, read back Bus Status, generate IFCs, run the 488.2 FindLstn protocol to discover the GPIB devices connected to the 8065, and link to an instrument. Besides reading and writing data strings, the VXI-11 Keyboard has controls for Device Clear, Device Trigger, and Serial Poll. Instrument links can be locked manually or automatically to prevent another user from interfering with your use of the GPIB devices.

## Ease of Installation

ICS's 8065 is very easy to install. Plug the 8065 into a network access point adjacent to your computer as shown in Figure 3 or use an Ethernet crossover cable to connect the 8065 directly to a PC's network port as shown in Figure 4. Then run ICS's Configuration Utility to configure the unit for your network. This utility lets you set the 8065's default static IP address to one that fits your network or you can enable the 8065 to accept an DHCP address setting if your network has a server that can assign network addresses. Next assign the 8065 a TCP resource name like 'gpib0' or 'testset1' that can be used with a VISA layer to identify the 8065. Then set the remaining network parameters. Save the setup and the 8065 is ready to be placed in its operating location.

The 8065 has a rear panel reset button can be used to reset the 8065 to its factory default settings in case the 8065's configuration needs to be reset or if you lost the 8065's static address.

## Never obsolete

ICS's 8065 stores its firmware in a non-volatile Flash. One of the 8065's features is a program download and store function which lets the 8065 receive program changes through its Ethernet interface. If a future

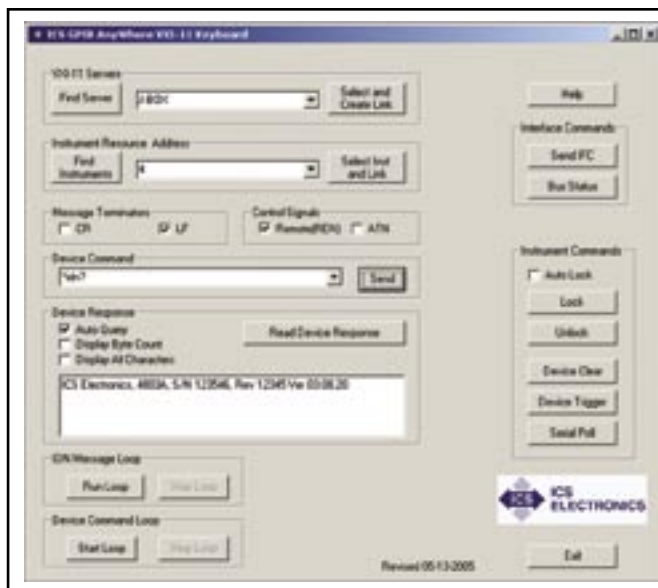


Figure 2 VXI-11 KeyBoard Controller Panel

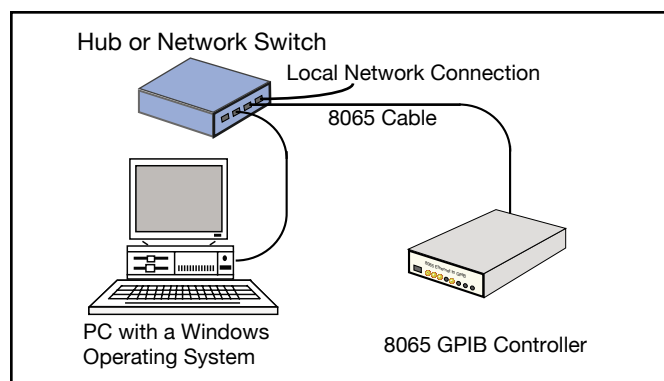


Figure 3 8065 Configuration Connections

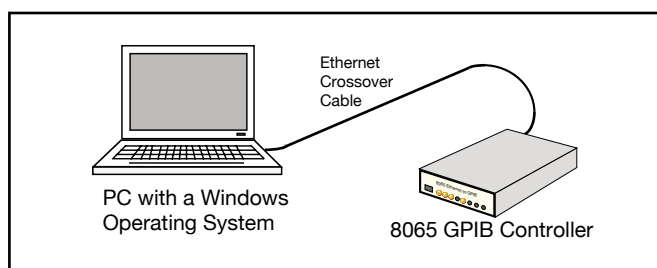


Figure 4 8065-Laptop Connection

firmware change is necessary, the new firmware and Upgrade Utility program can be downloaded from ICS's website. When the Upgrade Utility is run it transfers the new code to the 8065's memory. After validation, the new operating code is saved in Flash memory and will be used to run the 8065 when the 8065 is next power cycled. The factory code is never overwritten so the user can always revert back to the factory code if a problem occurs with the upgrade.

## Hardware

ICS's 8065 Controller is packaged in ICS's small metal Minibox™ case that provides proven EMI/RFI protection and rack mount capability. Rear panel RJ-45 and GPIB connectors provide access to the network and to the GPIB bus. Front panel LEDs provide visual indication of the network and GPIB bus status and diagnostic help for troubleshooting system problems.

One or two 8065s can be rack mounted in a 1 U high space. Chose from a single rack kit that holds one unit or the dual rack kit that holds two units.

## Network Communication

The client application uses the VXI-11 protocol to communicate with the 8065 and through it to control and transfer data to and from GPIB instruments. The VXI-11 protocol operates over a TCP/IP network. The TCP transportation layer and IP protocol guarantees error free communication with the 8065 over the network (company intranet or world-wide Internet) as long as the connection is maintained.

The 8065 has communication timeout and keepalive capability to maintain the communication link with the client. When the 8065 discovers that the communication link is no longer active, it closes that channel or channels and releases all resources that were used by the client. This unlocks any instruments links, destroys the links and returns all resources to the pool for the next user.

The ubiquity of TCP/IP networks and the world wide Internet allow you to operate a 8065 virtually anywhere in the world and to control it from anywhere. However there is a practical side to 8065's placement. Company intranets have many different architectures to adapt them to the needs of each company. Data transmissions in many cases are restricted to groups, areas or domains to maintain company security and safety. Consult with your IT manager on how to best configure the 8065 when installing it outside of your local network group.

## Multiuser Capabilities

ICS's 8065 Ethernet to GPIB Controller supports up to 15 clients at a time. This lets multiple users share equipment from anywhere in the world at anytime.

Figure 5 on the right shows a 8065 being used to control a rack of test instruments on a factory floor. The test technician's computer and the 8065 are both connected to a local network hub or switch. The test program is normally run in the test technician's computer.

When the Test Engineer has to upgrade or modify the test program he can run the new program from his computer and make any necessary changes without having to have a duplicate set of the production test equipment in his lab. This is a significant cost savings.

The Field Engineer can use the company's Virtual Private Network to gain access to the company's network over the Internet. He too can become a 8065 client without impacting the test setup.

In a production test environment, the Engineering and Field Engineer would normally not access the Test Equipment at the same time that it was being used by the Test Technician. However, in other applications with remote data collection equipment, such as in a weather station, the instruments could be accessed by several clients at the same time. Here one client may be looking at a data logger while another client could be reading current conditions. The 8065 supports multiple clients using different instruments at the same time.

## VXI-11 Background

The VXI-11 Standard was created as a way to control instruments over a TCP/IP network. VXI-11 is the overall VXI-11 document and describes the network protocol. There are three sub-standards. VXI-11.1 is for a VXI chassis and is not applicable to the 8065. The VXI-11.2 Standard describes the operation of a VXI-11 Interface such as ICS's Model 8065. VXI-11.3 describes the control of LAN instruments.

The 8065 responds to all VXI-11.2 commands to control the GPIB interface. These commands let the 8065 operate as an IEEE-488.1 Controller and do such familiar tasks as transfer data to/from devices, send Device Clear and Device Triggers, pulse the IFC line, set/reset REN, set/reset ATN, perform Serial Polls and read back the states of the

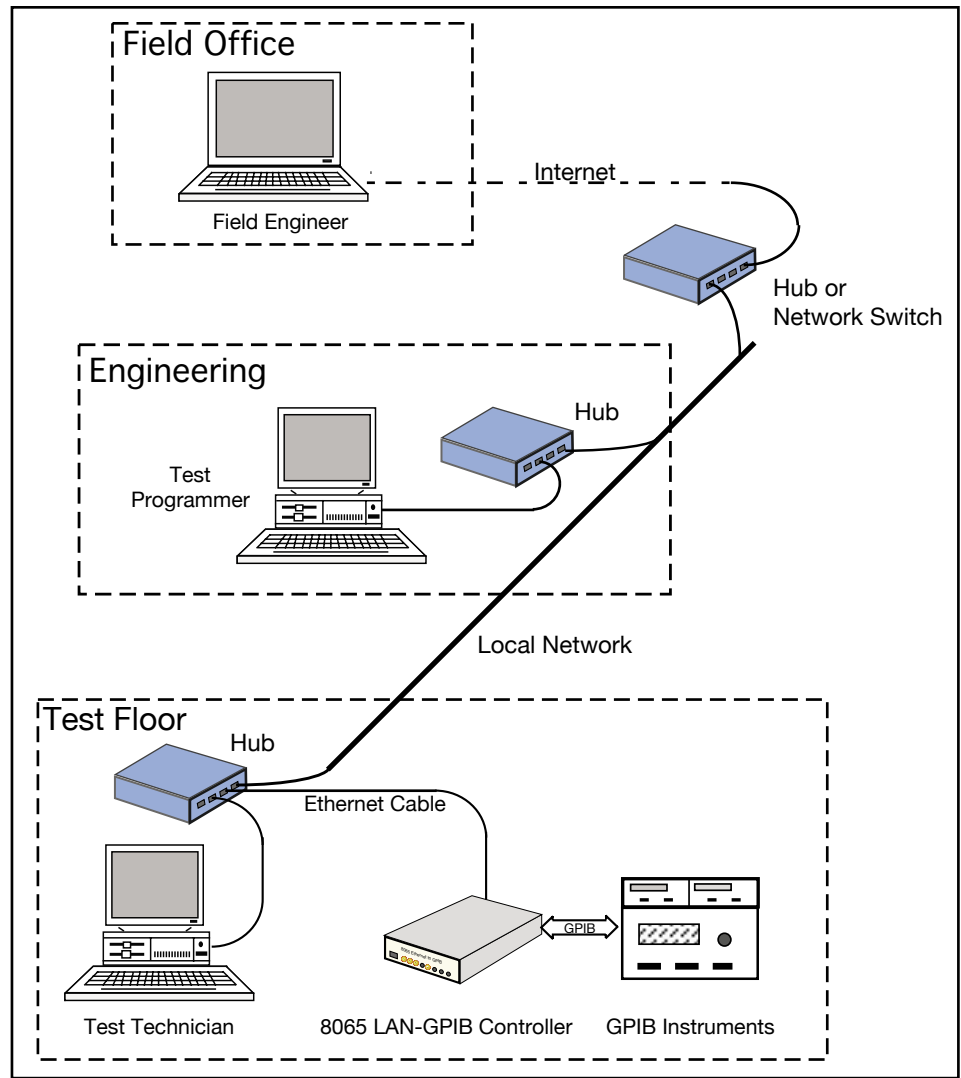


Figure 5 8065 Multi-user Application

REN, NDAC and SRQ lines. The 8065 also sends 488.1 commands and performs Pass Control.

The 8065 does not restrict the client application from using the IEEE-488.2 Common Commands. The 8065 passes all IEEE-488.2 Common Commands onto the selected device and returns all responses to the client application. It is the IEEE-488.2 compatible device that actually executes the 488.2 Common Commands, not the 8065. IEEE-488.2 Controller Protocols like FindLstn are implemented in the client application and utilize the 8065's IEEE-488.1 controller capabilities.

VXI-11.3 LAN Instruments have the capability to send/receive data, to receive Device Clear and Device Triggers and to be Serial Polled. They also generate Service Requests through an interrupt channel. When the 8065 is used with a GPIB device, the two units together appear as a VXI-11.3 instrument to the client.

## 8065 Advantages

ICS's 8065 is a newer product and takes advantage of today's newer technologies. First the 8065 is a 100 percent VXI-11.2 and VXI-11.3 compatible Ethernet-to-GPIB Controller. What this means to you is complete GPIB control capability and the ability to implement the IEEE-488.2 Controller Protocols like FindLstn. Competitive units operate mainly as VXI-11.3 interfaces. (See the VXI-11 Background section.)

The 8065 supports SRQ handling, serial polling and SRQ notify. Secondly the 8065 supports multiple clients as part of its standard firmware. Finally the 8065 is designed as a RoHS compliant instrument. Fully RoHS compliant versions will be available in 2006 at no increase in price.

## 8065 SPECIFICATIONS

### Supported Standards

#### IEEE 488.1 Capabilities:

The 488-USB meets IEEE-STD-488.1 with the following capabilities:

- AH1, SH1, C1, C2, C3, C4, and C9
- E2 Drivers incorporate power up/down protection.

#### IEEE 488.2 Compatible

Runs all required 488.2 controller protocols and includes bus signal line monitoring.

#### 488 Bus Performance

Long term GPIB transfer rates are limited by the LAN data transfer rate, the Client-computer performance and the GPIB device. Short term 8065 data rates are:

GPIB to 8065	>180 kbyte/s
8065 to GPIB	> 180 kbytes.s
GPIB Devices	14 loads
	64 addresses
8065 address	0 to 30 [0]

#### VXI-11 Capabilities

Fully VXI-11.2 and VXI-11.3 compliant

VXI-11.2	Interface Control
VXI-11.3	Device Control
Clients	1 to 15
Channel types	Data, Abort and Interrupt
Instrument links	64 max

#### RPC Protocol

Conforms to ONC RPC Version 2

#### Ethernet Interface

Type	IEEE 802.3 compliant
Speeds	10BaseT (10 Mb/s)
	100BaseT(100 Mb/s)
IP Address	Static or DHCP
Factory setting	192.168.0.254 static
Interface name	any [gpib0]

### System Requirements

Computer with an IEEE 802.3 LAN interface.  
Requires RPC support or a VXI-11 compliant VISA layer installed.

### Supported Software

The 8065 supports the following application and program languages:

NI LabVIEW (4.0 thru 7.1)  
Agilent VEE  
Agilent IntuiLink and Benchlink  
MathWorks MathLab  
Visual Basic 6.0\*  
Visual C++ 6.0\*

\* with VISA or RPC calls

### Controls and Indicators

#### CONTROLS

Power	Front-panel switch
Reset	Rear-panel pushbutton

#### LEDs

PWR	Indicates power on
RDY	Unit has passed self test
LNK	Unit connected to an active LAN
ACT	Transferring messages to/from the network
TALK	Unit is addressed to talk
LSTN	Unit is addressed to listen
SRQ	SRQ asserted on GPIB bus
ERR	Unit has detected a soft 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)
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Weight	1.6 lbs. (0.73 kg.) plus adapter
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Construction	All metal case
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Temperature	
Operating	-10 °C to +55 °C
Storage	-40 °C to + 70 °C

Humidity	0-90% RH non-condensing
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Shock/Vibration	Normal handling
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Connectors	
GPIB	GPIB 24 pin ribbon with metric studs.
Ethernet	RJ-45

Power	9 to 32 Vdc @ 4 VA
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RFI/EMI	CE Certified
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### Included Accessories

Instruction Manual  
CD-ROM with VXI-11 Keyboard Controller program and Configuration Utility.  
LAN Crossover Cable.  
UL/CSA/VDE approved AC power Adapters provided for:

US - 115±10% Vac, 60 Hz (std)  
Europe - 230±10% Vac, 50/60 Hz  
UK - 230±10% Vac, 60 Hz  
Japan - 100±10% Vac, 50/60 Hz

LabView is a trademark of National Instruments, Austin, TX.

VEE, IntuiLink and Benchlink are trademarks of Agilent Technologies, Palo Alto, CA.

The VXI-11 Specification is available from the VXI Consortium at <http://www.vxibus.org/specs.html>

## ORDERING INFORMATION

### Part Number

Ethernet - GPIB Controller with 115 VAC adapter, Manual and CD-ROM 8065

Ethernet - GPIB Controller with 230 VAC adapter, Manual and CD-ROM (Specify plug style) -E (Europe), -B (UK), -A (Australia)

GPIB Accessory Cables See separate data sheet

Rack Mounting Kits (holds one or two 8065s). See separate data sheet Single - 114210, Dual - 114211