

Tips on using Agilent GPIB Solutions in National Instrument's LabVIEW Environment

Application Note

Introduction

Making the hardware connection and control is the first step toward mastering the whole connectivity challenge. With instrument connectivity standards such as the general-purpose interface bus (GPIB), universal serial bus (USB), local area network (LAN), and LAN eXtensions for Instrumentation (LXI), developers face the challenge of integrating these instrument connectivity standards into their systems. This is particularly true when instruments and connectivity hardware are from various suppliers, resulting in hardware driver incompatibility.

Using Agilent's connectivity software and hardware, you can establish a connection control to a personal computer (PC) in a flash and help developers to balance design considerations, take advantage of various technologies, and extend the lives of their systems.

By expanding your range of input/output (I/O) alternatives, you can enable new usage models that boost productivity and add new tools that protect your investments in system hardware and software. The foundation of these benefits is an approach called Agilent Open, which simplifies system development through system ready instrumentation, open software environments, and PC-standard I/O.

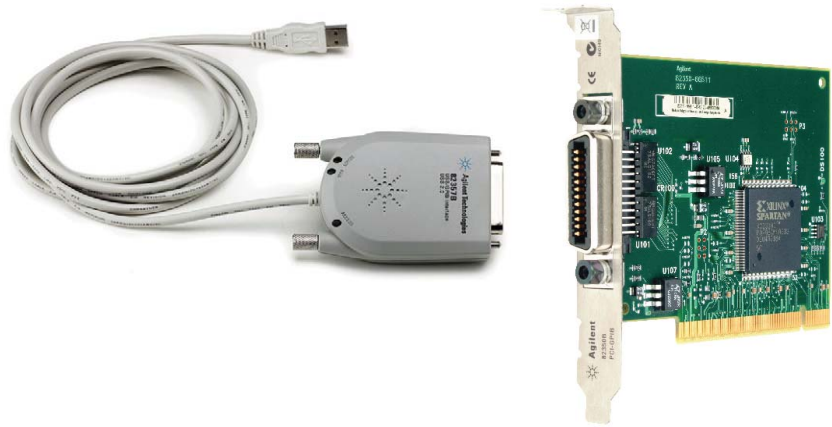


Figure 1. Agilent 82357B USB/GPIB converter and 82350B GPIB card

This application note provides answers to frequently asked questions about incorporating Agilent GPIB connectivity products into a National Instrument (NI) LabVIEW system. These tips give an insight on how to use the Agilent GPIB interface card or converter (see Figure 1) to control instruments in a NI system. Instructions are also given on how to use both Agilent and NI GPIB controllers at the same system and how to configure the NI-488.2 based system software when an Agilent GPIB card is used to replace a NI GPIB card. See Table 1 for Agilent's GPIB compatibility with NI LabVIEW system. To substitute NI GPIB hardware with an Agilent GPIB solution, please refer to Tip 3.

Table 1. Agilent GPIB compatibility with NI LabVIEW system

	Agilent Connection Expert	NI-MAX + LabVIEW	NI-MAX + LabVIEW with NI I/O
Agilent GPIB solutions	Plug and play	Tip 1	Tip 2



Agilent Technologies

Tip 1: How to use Agilent 82357B USB/GPIB converter in NI's MAX or LabVIEW?

If you are installing Agilent's 82357B USB/GPIB converter for the first time and do not have either NI LabVIEW or Agilent IO Libraries¹ Suite installed, you will need to:

- Enable the NIVISATulip.dll, and
- Enable the Agilent IO libraries Suite to work with NI 488.2.

NI-VISA² finds and accesses all GPIB devices. Although NI's MAX and NI-VISA Interactive Control are able to detect Agilent's hardware, NI-VISA does not configure Agilent hardware. You should use the Agilent I/O Libraries Suite configuration utility to configure the hardware.

Follow these installation steps:

Steps	Procedures
Step 1: Install NI-VISA library (with versions 3.6 to 4.4).	a) If you have the NI-VISA installed, you can then install Agilent VISA ³ as a secondary VISA. This is only valid with Agilent VISA version K and later. b) If Agilent IO Libraries Suite is already installed, side-by-side ⁴ mode will be enabled during installation of NI-VISA. You may proceed to step 3.
Step 2: Install Agilent IO Libraries Suite (you can download the software from this website: www.agilent.com/find/iosuite).	a) Choose Typical setup to detect NI-VISA and to enable side-by-side mode. See Figure 2 and Figure 3.

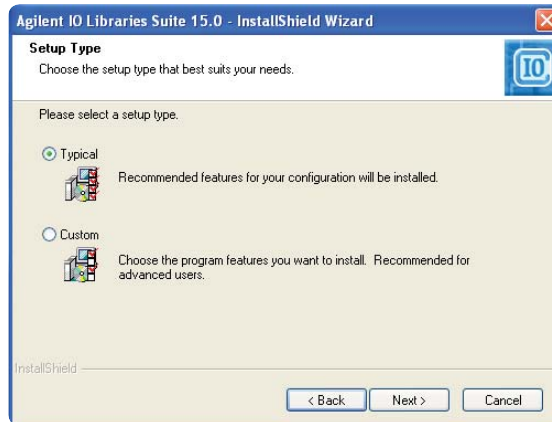


Figure 2. Typical setup for Agilent IO Libraries Suite.

¹ Agilent I/O Libraries

Each Agilent IO product is bundled with the Agilent I/O libraries. There are four I/O libraries included in Agilent IO libraries Suite: Agilent VISA, VISA, SICL, and Agilent 488. Each of them allows you to programmatically control instruments, send commands to them, and receive responses and data.

² NI-VISA

NI-VISA is the National Instruments implementation of the VISA I/O standard. NI-VISA includes software libraries, interactive utilities such as VISA Interactive Control, and configuration programs through Measurement and Automation Explorer for all your development needs. NI-VISA is standard across the National Instruments product line.

³ Agilent VISA

Agilent VISA (Virtual Instrument Software Architecture) can be used to develop I/O applications and instrument drivers that are interoperable with many other VISA applications from many vendors that comply with IVI Foundation standards.

⁴ Side-by-side mode

Side-by-side mode allows Agilent VISA to be used simultaneously with NI-VISA.



Figure 3. Enabling side-by-side mode in Typical setup

b) Alternatively, you can choose **Custom** setup for the installation, then select side-by-side mode. Complete the installation for IO libraries before Step 3. See Figure 4 and Figure 5.

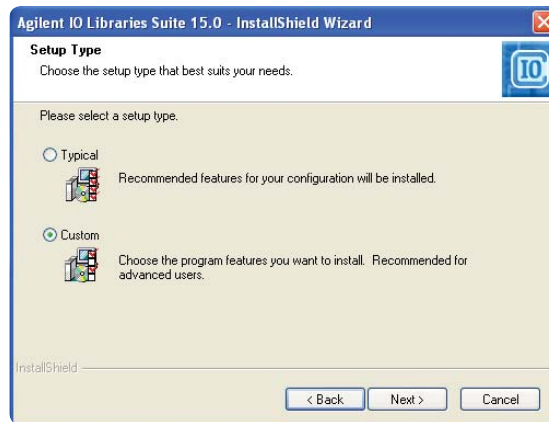


Figure 4. Custom setup for Agilent IO libraries Suite.

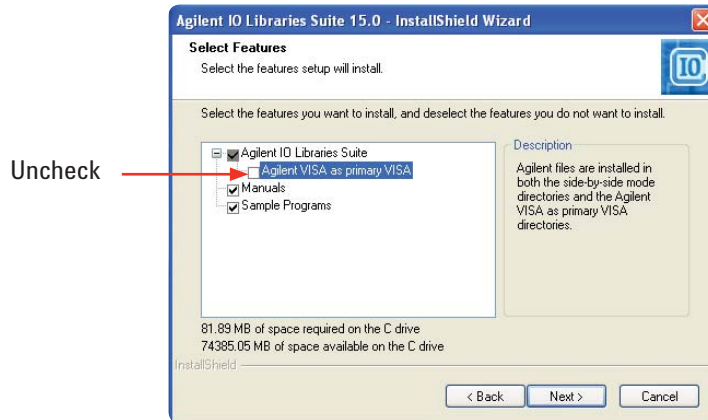


Figure 5. Enabling side-by-side mode in Custom setup

Step 3:

Connect the 82357B USB/GPIB converter to your PC's USB port.

Step 4:

Install Windows' "Found New Hardware Wizard."

a) You do not need to insert a CD-ROM; just click on the **Next** button until the installation is complete. See Figure 6, Figure 7, and Figure 8.



Figure 6. Installing the Agilent 82357B USB/GPIB



Figure 7. Initializing the Agilent 82357B USB/GPIB



Figure 8. Agilent 82357B USB/GPIB installation completed

b) Repeat step 4 (a) when you see "Found New Hardware Wizard" message box appearing second time.

Steps

Procedures

Step 5:
Connect the USB/GPIB converter to your instrument.

Apply power to the instrument and ensure that it is addressed for listening or talking over the GPIB interface. You can use the Agilent Connection Expert to check the connection. See Figure 9.



Figure 9. Connecting the USB/GPIB converter to the instrument

Step 6:
Enable the NI-VISA Passport for Tulip so that NI-VISA is able to recognize and detect Agilent hardware.

The NI-VISA Passport is a software module included with NI-VISA to support the use of Agilent hardware and is not enabled by default. To activate this module, follow the steps below:

- Use the NI Measurement and Automation Explorer (NI-MAX). For version 3.1 and subsequent versions of NI-MAX, click on **Tools > NI-VISA > VISA Options...**
- Select the **Passport for Tulip (NIVisaTulip.dll)** check box. See Figure 10.
- Click **Save** to save your settings, then exit NI-MAX.

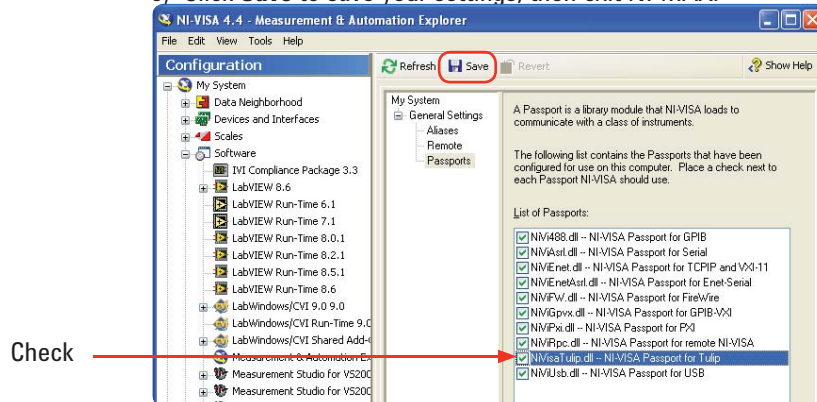


Figure 10. Enabling the NI-VISA Passport for Tulip

- Close and restart NI-MAX software. You should see your instrument listed under "Devices and Interfaces" as "Miscellaneous VISA Resource."
- NI-VISA and NI utilities such as VISA Interactive Control (VISAIC) can now access the Agilent 82357B USB/GPIB interface converter.

Agilent IO Libraries Suite includes the Agilent 488 library. This allows you to use NI-488.2 and compatible programs from other vendors' 488 libraries with Agilent GPIB interfaces and other vendors' interfaces, simultaneously.

If your test system includes only Agilent GPIB interface hardware and software, you do not need to take any special action to use Agilent 488. If your system includes NI-488.2 software from NI, or any other vendor's compatible implementation, you may need to explicitly enable Agilent 488.

Step 7:

Enable NI 488.2 using Agilent Connection Expert.

a) Enable the NI 488.2 using Agilent Connection Expert 15.x.

i) Select **Tools > Agilent 488...** See Figure 11.

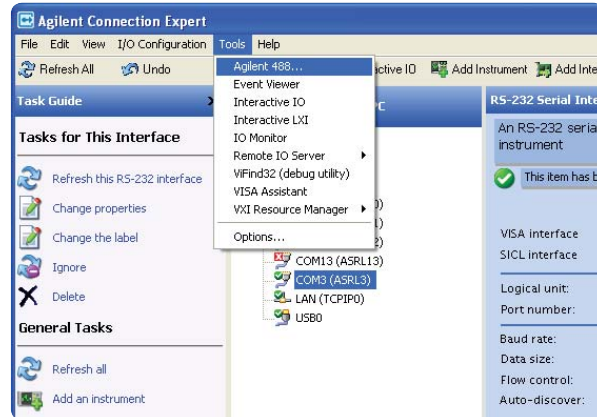


Figure 11. Selecting Agilent 488...

ii) Select the **Agilent 488 Options** tab. See Figure 12.

iii) Select **Enable Agilent GPIB cards for 488 programs**.



Figure 12. Enabling Agilent 488 programs

b) Enable NI 488.2 using Agilent Connection Expert 14.x.

i) Select **Tools > Options Agilent 488 Options**.

ii) Select **Enable Agilent GPIB cards for 488 programs**.

For more information, please refer to the Agilent IO Libraries Suite help topic "Using Agilent 488 with NI-488.2" from the *Agilent 488 Online Reference and User's Guide*.

Tip 2: How to use both Agilent GPIB and NI GPIB converters in the same system?

You can use NI-VISA to access Agilent GPIB converters such as Agilent GPIB, NI GPIB controller or PCI-GPIB card in the same system. To do so, you will need to enable the NI-VISA Passport editor in NI-MAX.

NI-VISA finds and accesses any GPIB or VXI devices. Although NI-MAX and NI-VISA Interactive Control are able to detect Agilent's hardware, NI-VISA does not configure the Agilent hardware; you must use the Agilent I/O Libraries Suite configuration utility to configure that hardware.

If you have already installed NI-VISA, you can install Agilent VISA as a secondary VISA (for Agilent VISA version K and later). If you already have Agilent VISA installed and are now installing NI-VISA, you can select NI-VISA as the primary VISA and Agilent VISA as the secondary VISA.

Use the following procedures to enable the NI-VISA Passport editor in NI-MAX to work with Agilent hardware:

Procedures

- Use the NI Measurement and Automation Explorer (NI-MAX) to enable the NI-VISA Passport editor. For version 3.1 and subsequent versions of NI-MAX, click on **Tools > NI-VISA > VISA Options...**
- Select the **Passport for Tulip (NIVisaTulip.dll)** check box. See Figure 13.
- Click **Save** to save your settings, then exit NI-MAX.

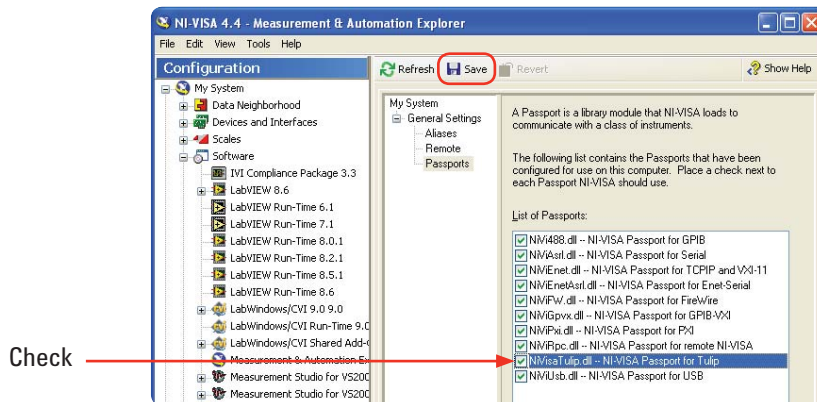


Figure 13. Enabling the NI-VISA Passport editor in NI-MAX

- Close and restart NI-MAX software. You should see your instrument listed under "Devices and Interfaces" as "Miscellaneous VISA Resource."

If you have both Agilent and NI GPIB controllers in the same system, the controllers must be configured with different interface names; for example, GPIB0, GPIB1, and so forth. If both vendors try to use the same interface address, the NI-VISA reports an error from viFindRsrc or VISA Find Resources.

NI-VISA will assign to an Agilent GPIB card a VISA interface name of GPIBn, where n is the trailing number of the SICL name assigned by the Agilent IO Configuration program. If the SICL name does not have a trailing number, the n will be assigned from the logical unit number assigned by the Agilent IO Config program. If Agilent VISA has configured an NI-488 GPIB card, it will normally default the SICL name to GPIB0.

Tip 2 (continued)

The NI-VISA Library Passport for Tulip will then map this back to NI-VISA as GPIB0. This will cause a conflict with the GPIB0 that is already mapped to the NI-488 GPIB card in NI-VISA. NI-VISA would not be able to recognize the GPIB interface. The workaround for this problem is to run Agilent IO Config and edit the SICL name for this card to another address (e.g., GPIB9). See Figure 14.

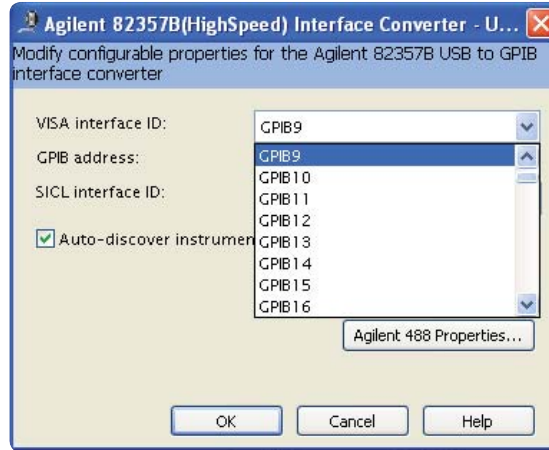


Figure 14. Selecting the VISA Interface ID to GPIB9

Tip 3: How to configure your software if you replace your NI GPIB card with an Agilent GPIB Card, when your software is written using NI-488.2?

With the introduction of the Agilent IO Libraries Suite version 14.1 and subsequent versions, you can now use an Agilent GPIB card or converter with third party vendor software written with NI-488.2.

If your system includes NI- 488.2 software from NI, or any other vendor's compatible implementation, you may need to explicitly enable Agilent 488. To do this, connect Agilent Connection Expert, click **Tools > Agilent 488...** > check on **Enable Agilent GPIB cards for 488 programs**. See Figure 15.



Figure 15. Enabling the VISA 488 program

This setting allows correct operation of 488.2 programs with both Agilent and third-party GPIB interfaces (even simultaneously). If you receive errors from third-party tools (such as NI-MAX) when Agilent 488 is enabled, disable Agilent 488, use the third-party tool, then re-enable Agilent 488.

Summary

With these tips and tricks, you can now create flexible test systems by incorporating Agilent GPIB connectivity products into a NI Labview system. You can kick-start measurements sooner without having to make extensive changes to your system and at no additional cost.

Related Literature

Please refer to the publication below for further information.

Publication title	Publication number
IO Libraries Suite 15 Connectivity Guide with Getting Started	5989-6133EN

Related Web Resources

- To download Agilent IO Libraries Suite latest software, go to the following URL:
www.agilent.com/find/iosuite



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