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

Application Note

KEYSIGHT
TECHNOLOGIES

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 Keysight Technologies, Inc. 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 Keysight Open, which simplifies system development through system ready instrumentation, open software environments, and PC-standard I/O.

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

Table 1. Keysight GPIB compatibility with NI LabVIEW system

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

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

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

If you are installing Keysight's 82357B USB/GPIB converter for the first time and do not have either NI LabVIEW or Keysight IO Libraries[1] Suite installed, you will need to:
 – Enable the NIVISATulip.dll, and
 – Enable the Keysight IO libraries Suite to work with NI 488.2.

NI-VISA[2] finds and accesses all GPIB devices. Although NI's MAX and NI-VISA Interactive Control are able to detect Keysight's hardware, NI-VISA does not configure Keysight hardware. You should use the Keysight I/O Libraries Suite configuration utility to configure the hardware.

Follow these installation steps:

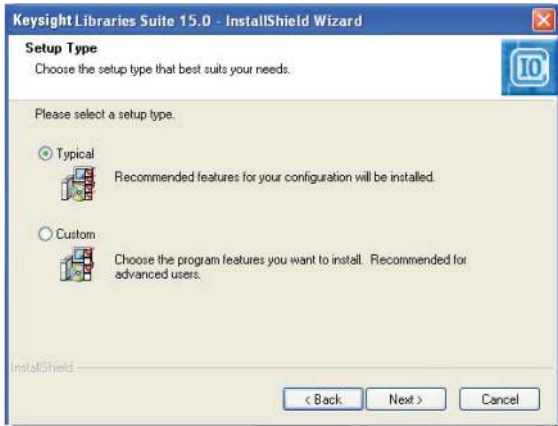| Steps	Procedures
Step 1: Install NI-VISA library (with versions 3.6 to 4.4).	a) If you have the NI-VISA installed, you can then install Keysight VISA[3] as a secondary VISA. This is only valid with Keysight VISA version K and later. b) If Keysight IO Libraries Suite is already installed, side-by-side[4] mode will be enabled during installation of NI-VISA. You may proceed to step 3.
Step 2: Install Keysight IO Libraries Suite (you can download the software from this website: www.keysight.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 Keysight IO Libraries Suite.

[1] Keysight I/O Libraries
Each Keysight IO product is bundled with the Keysight I/O libraries. There are four I/O libraries included in Keysight IO libraries Suite: Keysight VISA, VISA, SICL, and Keysight 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] Keysight VISA
Keysight 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 Keysight VISA to be used simultaneously with NI-VISA.

Tip 1: How to use Keysight 82357B USB/GPIB converter in NI's MAX or LabVIEW (continued)

Steps	Procedures

Uncheck →

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 Keysight IO libraries Suite.

Uncheck →

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

Tip 1: How to use Keysight 82357B USB/GPIB converter in NI's MAX or LabVIEW (continued)

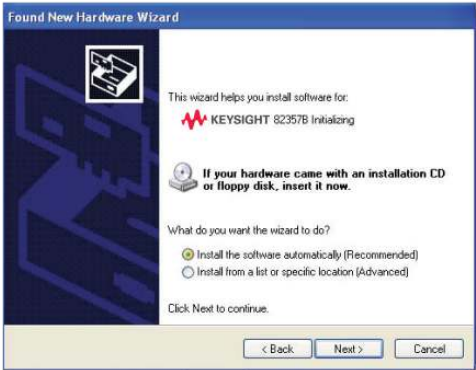| Steps	Procedures
Step 3: Connect the 82357B USB/GPIB converter to your PC's USB port.	
Step 4: Install Windows' "Found New Hardware Wizard."	a) You do not need to insert a CD-ROM; just click on the Next button until the installation is complete. See Figure 6, Figure 7, and Figure 8.

Figure 6. Installing the Keysight 82357B USB/GPIB

Figure 7. Initializing the Keysight 82357B USB/GPIB

Figure 8. Keysight 82357B USB/GPIB installation completed

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

Tip 1: How to use Keysight 82357B USB/GPIB converter in NI's MAX or LabVIEW (continued)

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 Keysight Connection Expert to check the connection. See Figure 9.

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

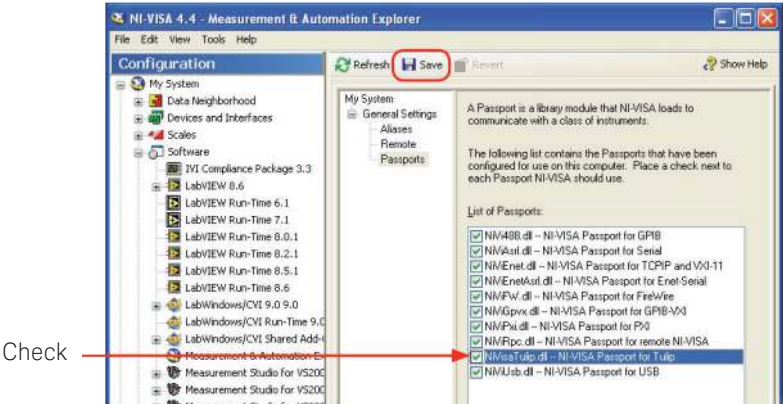| Steps	Procedures
Step 6: Enable the NI-VISA Passport for Tulip so that NI-VISA is able to recognize and detect Keysight hardware.	The NI-VISA Passport is a software module included with NI-VISA to support the use of Keysight hardware and is not enabled by default. To activate this module, follow the steps below: a) 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... b) Select the Passport for Tulip (NIVisaTulip.dll) check box. See Figure 10. c) Click Save to save your settings, then exit NI-MAX.

Check

Figure 10. Enabling the NI-VISA Passport for Tulip

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

e) NI-VISA and NI utilities such as VISA Interactive Control (VISAIC) can now access the Keysight 82357B USB/GPIB interface converter.

Tip 1: How to use Keysight 82357B USB/GPIB converter in NI's MAX or LabVIEW (continued)

Steps	Procedures

Keysight IO Libraries Suite includes the Keysight 488 library. This allows you to use NI-488.2 and compatible programs from other vendors' 488 libraries with Keysight GPIB interfaces and other vendors' interfaces, simultaneously.
If your test system includes only Keysight GPIB interface hardware and software, you do not need to take any special action to use Keysight 488. If your system includes NI-488.2 software from NI, or any other vendor's compatible implementation, you may need to explicitly enable Keysight 488.

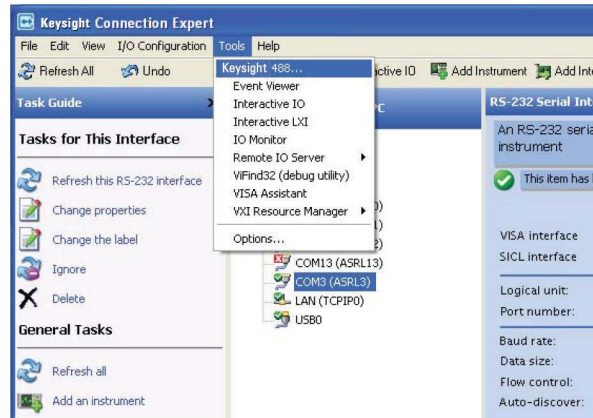|	
Step 7: Enable NI 488.2 using Keysight Connection Expert.	a) Enable the NI 488.2 using Keysight Connection Expert 15.x. i) Select Tools > Keysight 488... See Figure 11.

Figure 11. Selecting Keysight 488...

ii) Select the Keysight 488 Options tab. See Figure 12.
iii) Select Enable Keysight GPIB cards for 488 programs.

Figure 12. Enabling Keysight 488 programs

b) Enable NI 488.2 using Keysight Connection Expert 14.x.
  i) Select Tools > Options Keysight 488 Options.
  ii) Select Enable Keysight GPIB cards for 488 programs.

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

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

You can use NI-VISA to access Keysight GPIB converters such as Keysight 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 Keysight's hardware, NI-VISA does not configure the Keysight hardware; you must use the Keysight I/O Libraries Suite configuration utility to configure that hardware.

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

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

Procedures

a) 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…
b) Select the Passport for Tulip (NIVisaTulip.dll) check box. See Figure 13.
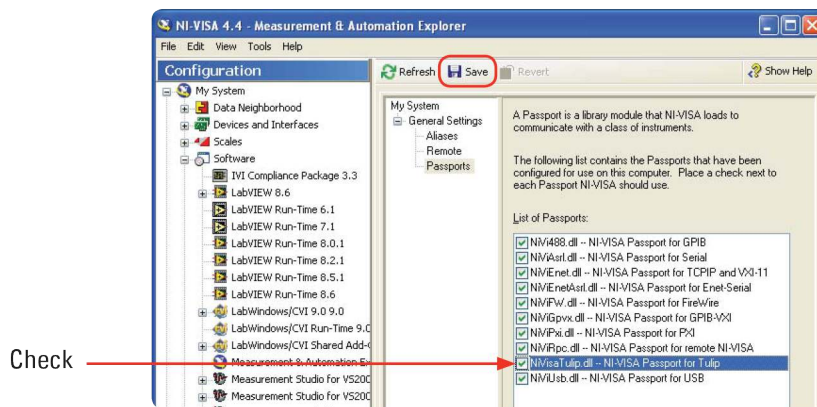c) Click Save to save your settings, then exit NI-MAX.

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

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

If you have both Keysight 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 a Keysight GPIB card a VISA interface name of GPIBn, where n is the trailing number of the SICL name assigned by the Keysight 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 Keysight IO Config program. If Keysight VISA has configured an NI-488 GPIB card, it will normally default the SICL name to GPIB0.

Tip 2: How to use both Keysight GPIB and NI GPIB converters in the same system (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 Keysight IO Config and edit the SICL name for this card to another address (e.g., GPIB9). See Figure 14.
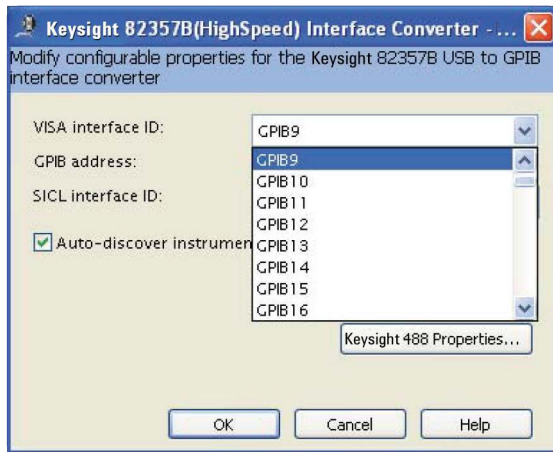

Figure 14. Selecting the VISA Interface ID to GPIB9

Tip 3: How to confi gure your software if you replace your NI GPIB card with a Keysight GPIB Card, when your software is written using NI-488.2

With the introduction of the Keysight IO Libraries Suite version 14.1 and subsequent versions, you can now use a Keysight 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 Keysight 488. To do this, connect Keysight Connection Expert, click Tools > Keysight 488...> check on Enable Keysight 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 Keysight and third-party GPIB interfaces (even simultaneously). If you receive errors from third-party tools (such as NI-MAX) when Keysight 488 is enabled, disable Keysight 488, use the third-party tool, then re-enable Keysight 488.

Summary

With these tips and tricks, you can now create flexible test systems by incorporating Keysight 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 Keysight IO Libraries Suite latest software, go to the following URL:
www.keysight.com/find/iosuite

myKeysight

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A personalized view into the information most relevant to you.

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