COM Automation

Online Help

KEYSIGHT TECHNOLOGIES

Notices

Revision History

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COM Automation—At a Glance

The *Keysight Logic Analyzer* application includes the COM Automation Server. This software lets you write programs that control the *Keysight Logic Analyzer* application from remote computers on the Local Area Network (LAN).

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4 COM Automation Reference

1 COM Automation Overview

In some test and measurement environments, the process of making a measurement and analyzing the results become routine or repetitive. In other environments, it may be more convenient to make measurements or analyze data from a remote PC. Whatever the situation, you can benefit from performing measurement tasks programmatically through a Visual C++ or Visual Basic program.

The COM Automation Server is part of the *Keysight Logic Analyzer* application. It gives PC applications a COM interface to the logic analyzer (see Figure 1). This lets you write programs that communicate with the logic analyzer using a COM model definition and take advantage of the ease of programming offered by the Visual Studio Environment (that is, Visual Basic or Visual C++).

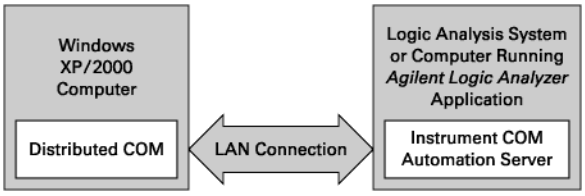


Figure 1 COM Automation Architecture

By executing programs using the Instrument COM Automation Server, you manipulate the logic analysis environment and its functional components as Objects. You manipulate objects by using the properties and methods associated with the objects. Methods represent actions you take against the objects. Properties represent characteristics of the objects, such as their type or size.

Each object implements a dual interface through which you can manipulate the object. Each object implements an IDispatch interface for Automation and a Component Object Model (COM) interface for direct access to object members (properties and methods). By importing the Instrument Automation Server's type library, you can employ early binding by using the COM interface. Early binding makes all calls into interface members faster at run time.

For more information on Logic Analyzer Objects and the components that manipulate them, refer to Object Hierarchy Overview (see page 80).

2 Setting Up for COM Automation

A remote computer connected to the logic analyzer via LAN uses Distributed COM (DCOM) to control the logic analyzer. COM is used when the logic analyzer is controlled from within the logic analyzer itself. Because COM connections work without any additional configuration, this getting started section only pertains to Distributed COM.

The following assumptions are made in this getting started section. Verify the validity of each before proceeding.

- You have changed the Windows XP firewall settings on the logic analyzer to allow remote access to the services required for DCOM.
- Both the remote computer and logic analyzer are on the same LAN and both can "see" each other in "My Network Places" (or communicate with each other using the ping command in a Command Prompt window). See supported networking configurations (see page 16) for more information.
- The logic analyzer is running version 02.00 or later of the *Keysight Logic Analyzer* application.
- You are reasonably familiar with Windows.

Setting up your remote computer to communicate with the logic analyzer requires the following three summarized steps:

1 Install the LA COM Automation client software (see page 17) on your remote computer.

2 Test your Distributed COM connection (see page 18).

See Also

- Using COM Automation (see page 23)

Supported Networking Configurations

There are many ways of setting up your remote computer to communicate with the logic analyzer, but due to the security requirements of Distributed COM, only two configurations are supported. The first configuration is when both the remote computer and the logic analyzer are members of a "Workgroup", and the second configuration is when both the remote computer and the logic analyzer are members of a "Domain".

Keysight 1680-series logic analyzers and 16900-series logic analysis systems are shipped from the factory such that "Everyone" has permission to launch and access the *Keysight Logic Analyzer* application via Distributed COM. The term "Everyone" refers to a different range of users depending on whether the logic analyzer is a member of a Domain or Workgroup. By default, the logic analyzer is configured as a member of a workgroup. Therefore, "Everyone" includes only those users who have been given logon accounts on the logic analyzer.

Workgroup

A workgroup is established by the logic analyzer administrator declaring the workgroup name and declaring the logic analyzer as a member of the workgroup. A workgroup does not require a network administrator to create it or control membership.

"Everyone" includes only those users who have been given logon accounts on the logic analyzer. By default, the logic analyzer is configured as members of a workgroup named WORKGROUP.

NOTE To set up a logon account for a new user, see the operating system's online help. For Distributed COM access, the user's account name and password must EXACTLY match their remote computer logon account name and password.

NOTE Recent Windows security patches require passwords to be set on accounts before Distributed COM access is allowed.

Domain

A domain is typically a large organizational group of computers. Network administrators maintain the domain and control which machines have membership in it.

"Everyone" includes those people who have membership in the domain. In addition, those with logon accounts can also access the analyzer.

See Also

- "*Keysight Logic Analyzers Isolated Network Setup White Paper*"

Step 1. Install the LA COM Automation client software

You can install either the Keysight Logic and Protocol Analyzer software package (on instruments or PCs hosting instruments) or the Keysight Logic and Protocol Analyzer COM Automation software package (on machines that do not need the full LPA software installed).

Because the logic analyzer and remote computer are on the same LAN, you can install the COM automation client software from the logic analyzer:

1 If you have changed the Windows XP firewall settings on the logic analyzer to allow remote access to shared folders, then on your remote computer, map a network drive to the logic analyzer (for example, \\computer-name\C$).

2 Navigate to the \Program Files\Keysight Technologies\Logic Analyzer directory on the mapped network drive.

3 Locate the "SetupLACOM.exe" file, and run it to install the LA COM Automation client software on your remote computer.

Next

- Step 2. Test your Distributed COM connection (see page 18)

Step 2. Test your Distributed COM connection

Once you have installed Keysight Logic and Protocol Analyzer install package or the Keysight Logic and Protocol Analyzer COM Automation install package, you can run the following tools to test your COM/Distributed COM connection to the logic analyzer or diagnose COM/DCOM connection issues.

- COM testing for 64-bit, unmanaged applications/scripts - C:\Program Files\Keysight Technologies\Logic Analyzer\LA COM Automation\agTestClient.exe
- COM testing for 32-bit, unmanaged applications/scripts: C:\Program Files\Keysight Technologies\Logic Analyzer\LA COM Automation\agTestClient_x86.exe
- COM testing for managed applications: C:\Program Files\Keysight Technologies\Logic Analyzer\COMConnectionTool.exe

If the COM Connection Tool does not resolve the problem, see also Distributed COM Troubleshooting (see page 19).

Distributed COM Troubleshooting

If the Client Test program (see page 18) fails to connect to the logic analyzer:

- Make sure the remote computer and logic analyzer can "see" each other in "My Network Places" (or communicate with each other using the ping command in a Command Prompt window).
- Make sure the logic analyzer is running version 02.00 or later of the *Keysight Logic Analyzer* application.
- See supported networking configurations (see page 16). If you are in a Workgroup, check that both the account name and password used on both the logic analyzer and remote computer match EXACTLY. Also, if you are in a Workgroup and have the Windows XP operating system, you must turn off simple file sharing (see page 19).

NOTE **Recent Windows security patches require passwords to be set on accounts before Distributed COM access is allowed.**

- Make sure you are logged in to the logic analyzer so the user and privileges are assigned correctly. The *Keysight Logic Analyzer* application does not have to be running; if it isn't, connecting via COM will automatically start it.
- To verify logic analyzer machine-wide Distributed COM properties (see page 19)
- To verify logic analyzer application Distributed COM properties (see page 20)
- To verify remote computer application Distributed COM properties (see page 21)
- Make sure the logic analyzer allows DCOM access though the firewall. Some IT departments are now automatically installing firewalls onto remote client computers. Verify your remote client computer also allows DCOM access through the firewall if one is installed.
- If you have a remote client computer that cannot connect to the logic analyzer and one that can, run ipconfig -all in the Command Prompt window on both computers to see how their LAN configurations differ. This may help in troubleshooting the problem.

To turn off simple file sharing

If both the remote computer and the logic analyzer are members of a "Workgroup" (see supported networking configurations (see page 16)) and the logic analyzer has the Windows XP operating system, you must turn off simple file sharing.

1 Open Windows Explorer (or double-click My Computer).
2 From the Windows Explorer menu, choose Tools>Folder Options....
3 In the Folder Options dialog, select the View tab.
4 In the "Advanced settings" options list, uncheck Use simple file sharing (Recommended).
5 Click OK to close the Folder Options dialog.

To verify logic analyzer machine-wide Distributed COM properties

Normally, the logic analyzer Distributed COM configuration is set at the factory. If this has been changed, you may have to set it back to the default settings.

To verify the machine-wide Distributed COM properties on the computer that runs the *Keysight Logic Analyzer* application:

1 From the Windows task bar choose Start>Run..., enter DCOMCNFG.EXE as the name of the program to open, and click OK.
2 Access the machine-wide Distributed COM properties, security, and protocols tabs:

- In the left-side pane of the Component Services window, browse to the Console Root, Component Services, Computers folder; then, right-click on My Computer and choose Properties from the popup menu.

3 In the Default Properties tab:

a Check the Enable Distributed COM on this computer option.

b For the Default Authentication Level, select Connect.

c For the Default Impersonation Level, select Identify.

4 In the COM Security tab:

a Under Access Permissions, click Edit Limits....

b In the Access Permission dialog, make sure the Everyone account has "Allow" checked for both Local Access and Remote Access.

c Click OK to close the Access Permission dialog.

d Under Launch and Activation Permissions, click Edit Limits....

e In the Launch Permission dialog, make sure the MACHINE\Administrators and Everyone accounts have "Allow" checked for: Local Launch, Remote Launch, Local Activation, and Remote Activation.

f Click OK to close the Launch Permission dialog.

5 In the Default Protocols tab:

a Make sure Connection-oriented TCP/IP is listed first.

6 Click OK to close the properties dialog.

To verify logic analyzer application Distributed COM properties

Normally, the logic analyzer Distributed COM configuration is set at the factory. If this has been changed, you may have to set it back to the default settings.

To verify the application's Distributed COM properties on the computer that runs the *Keysight Logic Analyzer* application:

1 From the Windows task bar choose Start>Run..., enter DCOMCNFG.EXE as the name of the program to open, and click OK.

2 Open the Keysight 168x/169x/169xx Logic Analyzer Properties dialog:

- In the left-side pane of the Component Services window, browse to Console Root, Component Services, Computers, My Computer, DCOM Config, Keysight 168x/169x/169xx Logic Analyzer; then, right-click and choose Properties from the popup menu.

3 In the Keysight 168x/169x/169xx Logic Analyzer Properties dialog, verify the following settings under each Tab heading indicated below.

Tab	Settings
General	Authentication Level should be set to "Default".
Location	Set to "Run application on this computer".

Security	Use custom launch and activation permissions. Verify "Everyone" has launch and activation permissions. If not: • Add "Everyone" and make sure "Allow" is checked for Local Launch, Remote Launch, Local Activation, and Remote Activation. Use custom access permissions. Verify "Everyone" has access permission. If not: • Add "Everyone" and make sure "Allow" is checked for Local Access and Remote Access. Use default configuration permissions.
Endpoints	Leave at default system protocols.
Identity	Set to "The interactive user".

4 In the Keysight 168x/169x/169xx Logic Analyzer Properties dialog, click OK.

To verify remote computer application Distributed COM properties

Normally, the remote computer Distributed COM configuration is set when you install the LA COM Automation client software. If this has been changed, you may have to set it back to the default settings.

To verify the application's Distributed COM properties on the remote computer:

1 From the Windows task bar choose Start>Run..., enter DCOMCNFG.EXE as the name of the program to open, and click OK.

2 Open the Properties dialog for Keysight 168x/169x/169xx Logic Analyzer:

a In the Component Services window, navigate the hierarchy tree to Component Services>Computers>My Computer>DCOM Config.

b In the DCOM Config folder, right-click on Keysight 168x/169x/169xx Logic Analyzer and choose Properties from the popup menu.

3 In the Keysight 168x/169x/169xx Logic Analyzer Properties dialog, verify the following settings under each Tab heading indicated below.

Tab	**Settings**
General	Authentication Level should be set to "Default".
Location	Normally, none of these options are selected, and the name of the computer on which to run the application is specified in the remote program (see the **Connect (see** page 95) object's **Instrument (see** page 224) property). However, the "Run application on the following computer" option can be checked, with the logic analyzer's computer name entered in the field that follows.
Security	Use default launch (and activation if on Windows XP) permissions. Use default access permissions. Use Custom configuration permissions. Verify that you have "Full Control".
Endpoints	Leave at default system protocols.
Identity	Normally, this tab does not appear (but it can if the *Keysight Logic Analyzer* application has been previously installed on the remote computer). If this tab appears, set to "The interactive user".

4 In the Keysight 168x/169x/169xx Logic Analyzer Properties dialog, click OK.

5 Close the Component Services window.

3 Using COM Automation

To programmatically control the logic analyzer via COM automation, you can use the integrated Microsoft Visual Basic for Applications (VBA) or you can install some other COM aware client software package like Visual Basic, Visual C++, LabVIEW, VEE, etc.

Using Visual Basic for Applications (VBA) in Microsoft Excel

1 Install the Microsoft Excel software.

2 Import the type library:

a In the Visual Basic Editor, choose the Tools>References... menu item.

b In the References dialog, select the library "Keysight 168x/169x/169xx Logic Analyzer Object Library".

3 In the Excel Visual Basic Editor, copy and paste the GetLAData() code below. (In Excel 2000: Execute Tools>Macro>Macros.... In the Macro Name box, type in "GetLAData". Then, press the Create button.)

4 Optionally, call the GetLAData() macro from a custom toolbar button, and watch the Worksheet update with the logic analysis data.

Example

```
Sub GetLAData()

' This Excel macro example transfers all of the bus/signal's
' from the first module in a 168x/9x/9xx Logic Analysis System to
' the Active Excel Worksheet.  Variables to modify are:
'
'  myInst    -> change to the hostname or IP address of the LA
'               you're connecting to (default is 'localhost'
'               if you're running Excel directly on the LA)
'  mySheet   -> change the worksheet to copy the data to
'               (default is the active worksheet)
'  myAnalyzer-> change to the analyzer name to transfer data from
'               (default is the first module)
'  myStartSample, myEndSample -> change to the data range to upload
'               (default is -10 and 10 respectively)
'

' Get the active Excel worksheet
Dim mySheet As Worksheet
Set mySheet = ActiveWorkbook.ActiveSheet

' Clear all of the cells in the worksheet
mySheet.Cells.ClearContents

' Create the 168x/9x/9xx Logic Analyzer Instrument object
' and connect to the Logic Analyzer
'
Dim myConnect As AgtLA.Connect
Dim myInst As AgtLA.Instrument
Set myConnect = CreateObject("AgtLA.Connect")
Set myInst = myConnect.Instrument("localhost")

' Run the measurement, wait for completion or time out
myInst.Run
myInst.WaitComplete (10)

' Get the first analyzer module
Dim myAnalyzer As AgtLA.AnalyzerModule
Set myAnalyzer = myInst.Modules(0)

' Upload a range of acquired data and copy to the Excel worksheet
Dim myBusSignal As AgtLA.BusSignal
```

```
Dim myData As AgtLA.SampleBusSignalData

Dim myNumDataRows As Long
Dim myStartSample As Long
Dim myEndSample As Long

colNum = 1           ' Start putting the data in the first column
myStartSample = -10  ' Sample data range to upload
myEndSample = 10

' Copy over all bus/signals
For Each myBusSignal In myAnalyzer.BusSignals
  Set myData = myBusSignal.BusSignalData
  mySheet.Cells(1, colNum) = myBusSignal.Name

  Select Case myBusSignal.BusSignalType
    Case AgtBusSignalSampleNum
      Dim lArray() As Long
      lArray = myData.GetDataBySample(myStartSample, myEndSample, _
          AgtDataLong, myNumDataRows)
      For rowNum = 0 To myNumDataRows - 1
        ' Rows start with 1, and the bus/signal name is on the first
        ' row; so, add 2.
        mySheet.Cells(rowNum + 2, colNum) = lArray(rowNum)
      Next rowNum
    Case AgtBusSignalTime
      Dim dArray() As Double
        dArray = myData.GetDataBySample(myStartSample, myEndSample, _
            AgtDataTime, myNumDataRows)
      For rowNum = 0 To myNumDataRows - 1
        mySheet.Cells(rowNum + 2, colNum) = dArray(rowNum)
      Next rowNum
    Case AgtBusSignalGenerated
      Dim vArray As Variant   ' Decimal holds max 96 bits unsigned.
      vArray = myData.GetDataBySample(myStartSample, myEndSample, _
          AgtDataDecimal, myNumDataRows)
      For rowNum = 0 To myNumDataRows - 1
        mySheet.Cells(rowNum + 2, colNum) = vArray(rowNum)
      Next rowNum
    Case AgtBusSignalProbed
      ' Long holds a maximum of 31 bits unsigned.
      lArray = myData.GetDataBySample(myStartSample, myEndSample, _
          AgtDataLong, myNumDataRows)
      For rowNum = 0 To myNumDataRows - 1
        ' format has hex for display purposes
        mySheet.Cells(rowNum + 2, colNum) = Hex$(lArray(rowNum))
      Next rowNum
 End Select

  ' Go to the next bus/signal
  colNum = colNum + 1
Next

End Sub
```

See Also

- Example Visual Basic Programs (see page 27)

Using Visual Basic (in Visual Studio)

Before you can use the Visual Basic programming environment to control the *Keysight Logic Analyzer* application, you must first import the Instrument Automation Server's type library into your project.

1 Choose the Project>References... menu item.

2 In the References dialog, select the library "Keysight 168x/169x/169xx Logic Analyzer Object Library".

See Also

- Example Visual Basic Programs (see page 27)

Example Visual Basic and Visual C++ Programs

- Loading, Running, Storing (see page 27)
- Setting Up Simple Triggers (see page 31)
- Setting Up Advanced Triggers (see page 35)
- Changing the Sampling Mode (see page 39)
- Checking the Logic Analyzer Software Version (see page 42)

See Also

- Additional Visual Basic Examples (see page 50)
- Using Visual Basic for Applications (VBA) in Microsoft Excel (see page 24)
- Using Visual Basic (in Visual Studio) (see page 26)

Loading, Running, Storing

In order to create an easy to use, yet powerful remote control mechanism, the design of the COM Automation Server adheres to the basic use model of "load-run-store".

In other words, to create a remote control application or a program that runs repetitive tests:

1 Use the *Keysight Logic Analyzer* application to go through each test once, and save the logic analyzer configurations and trigger setup specifications to files.

2 Then, from your program, load the appropriate logic analyzer configuration and trigger setup specification files, run the measurement, and store or act on the results as appropriate.

Example

If you encounter any name collisions (in other words, if you already have an object defined that uses the same name as an object in the Instrument Automation Server library), you can use the "AgtLA" library name prefix to resolve the conflict. For example, if you have a "Module" object defined, you can use "AgtLA.Module" to refer to the Instrument Automation Server's "Module" object.

Visual Basic

```
' When using Visual Basic outside of the Keysight Logic Analyzer
' application, you must create the Connect object (see
page 95) and use it
' to access the Instrument object.  In this example, "myInst"
' represents the Instrument object.
'
' When "using the Advanced Customization Environment (ACE)" (in the
online help),
' the Instrument object is already created and is globally
' accessible using "AgtLA".  In this example, substitute "myInst"
' with "AgtLA" to access the global Instrument object in VBA.

' Load the configuration file.
myInst.Open ("c:\LA\Configs\mpc860_demo_compare.ala")

' Load the logic analyzer trigger file.
Dim myAnalyzer As AgtLA.AnalyzerModule
Set myAnalyzer = myInst.GetModuleByName("My 1690A-1")
myAnalyzer.RecallTriggerByFile ("c:\LA\Triggers\TrigSpecFile.xml")

' Run the measurement, wait for it to complete.
myInst.Run
myInst.WaitComplete (20)

' Process/display/store captured data.
Dim myBusSignal As AgtLA.BusSignal
Dim myData As AgtLA.SampleBusSignalData
```

```
For Each myBusSignal In myAnalyzer.BusSignals
   ' Get Data from "ADDR".
   If myBusSignal.Name = "ADDR" Then
      Set myData = myBusSignal.BusSignalData

      'Upload a range of acquired data.
      Dim myArray() As Long   ' The size is defined in GetDataBySample.
      Dim NumRows As Long
      myArray = myData.GetDataBySample(-10, 10, AgtDataLong, NumRows)

      ' Find the largest bus/signal value.
      Dim LongValue As Long
      Dim LargestValue As Long
      LargestValue = 0
      For i = 0 To NumRows - 1
         LongValue = myArray(i)
         If LongValue > LargestValue Then
            LargestValue = LongValue
         End If
      Next i
      MsgBox "Largest value is: " + Str(LargestValue)

   End If
Next
```

Visual C++

```
//
//  This simple Console application demonstrates how to use the
//  Keysight 168x/9x/9xx COM interface from Visual C++.
//
//  This project was created in Visual C++ Developer.  To create a
//  similar project:
//
//    - Execute File -> New
//    - Select the Projects tab
//    - Select "Win32 Console Application"
//    - Select A "hello,World!" application (Visual Studio 6.0)
//
//  To make this buildable, you need to specify your "import" path
//  in stdafx.h (search for "TODO")
//
//  To run, you need to specify the host Logic Analyzer to connect
//  to (search for "TODO")
//

#include "stdafx.h"

////////////////////////////////////////////////////////////////////////
//
//  Forward declarations.
//
void DisplayError(_com_error& err);

////////////////////////////////////////////////////////////////////////
//
//  main() entry point.
//
```

```
int main(int argc, char* argv[])
{
   printf("*** Main()\n");

   //
   //  Initialize the Microsoft COM/ActiveX library.
   //
   HRESULT hr = CoInitialize(0);

   if (SUCCEEDED(hr))
   {
      try {   // Catch any unexpected run-time errors.
         _bstr_t hostname = "mtx33";   // myLAHostname.
         printf("Connecting to instrument '%s'\n", (char*) hostname);

         // Create the connect object and get the instrument object.
         AgtLA::IConnectPtr pConnect =
               AgtLA::IConnectPtr(__uuidof(AgtLA::Connect));
         AgtLA::IInstrumentPtr pInst =
               pConnect->GetInstrument(hostname);

         // Load the configuration file.
         _bstr_t configFile = "C:\\LA\\Configs\\config.ala";
         printf("Loading the config file '%s'\n", (char*) configFile);
         pInst->Open(configFile, FALSE, "", TRUE);

         // Get a specific analyzer module.
         _bstr_t moduleName = "MPC860 Demo Board";
         AgtLA::IAnalyzerModulePtr pAnalyzer =
               pInst->GetModuleByName(moduleName);

         // Load the logic analyzer trigger file.
         _bstr_t triggerFile = "C:\\LA\\Configs\\trigger.xml";
         printf("Loading the trigger file '%s'\n", (char*) triggerFile);
         pAnalyzer->RecallTriggerByFile(triggerFile);

         // Run the measurement, wait for it to complete.
         pInst->Run(FALSE);
         pInst->WaitComplete(20);

         // Process/display/store captured data.
         _bstr_t busSignal;
         _variant_t varArray;
         long numRowsRet;
         long numBytesPerRow;

         AgtLA::IBusSignalsPtr pBusSignals = pAnalyzer->GetBusSignals();
         for (long i = 0; i < pBusSignals->GetCount(); i++)
         {
            busSignal = pBusSignals->GetItem(i)->GetName();

            // Get data from "ADDR" bus.
            if (strcmp(busSignal, "ADDR") == 0)
            {
               long numSamples;
               long lBound;
```

```
                AgtLA::IBusSignalPtr pBusSignal =
                      pAnalyzer->GetBusSignals()->GetItem(busSignal);
                AgtLA::ISampleBusSignalDataPtr pSampleData =
                      pBusSignal->GetBusSignalData();
                varArray = pSampleData->GetDataBySample(-10, 10,
                      AgtLA::AgtDataRaw, &numRowsRet);
                numBytesPerRow = pBusSignal->GetByteSize();
                HRESULT hr = SafeArrayGetLBound(varArray.parray, 1,
                      &lBound);

                if (SUCCEEDED(hr))
                {
                   long uBound;
                   hr = SafeArrayGetUBound(varArray.parray, 1, &uBound);

                   if (SUCCEEDED(hr))
                   {
                      byte* pByteArray;
                      hr = SafeArrayAccessData(varArray.parray,
                            (void**) &pByteArray);

                      if (SUCCEEDED(hr))
                      {
                         numSamples =
                               (uBound - lBound + 1) / numBytesPerRow;
                         byte* pByte = pByteArray;
                         printf("Displaying '%s' ", (char*) moduleName);
                         printf("module\'s ADDR bus samples from -10 ");
                         printf("to 10:\n");

                         for (int i = 0; i < numSamples; i++)
                         {
                            printf("  sample[%d]: ", -10 + i);

                            for (int j = 0; j < numBytesPerRow; j++)
                            {
                               printf("%02x ", pByte[j]);
                            }

                            pByte += numBytesPerRow;
                            printf("\n");
                         }

                         printf("\n");
                         SafeArrayUnaccessData(varArray.parray);
                      }
                   }
                }
             }
          }
       }
       catch (_com_error& e) {
          DisplayError(e);
       }

       // Uninitialize the Microsoft COM/ActiveX library.
       CoUninitialize();
```

```
   }
   else
   {
      printf("CoInitialize failed\n");
   }

   return 0;
}

////////////////////////////////////////////////////////////////////////
//
//  Displays the last error -- used to show the last exception
//  information.
//
void DisplayError(_com_error& error)
{
   printf("*** DisplayError()\n");

   printf("Fatal Unexpected Error:\n");
   printf("  Error Number = %08lx\n", error.Error());

   static char errorStr[1024];
   _bstr_t desc = error.Description();

   if (desc.length() == 0)
   {
      // Don't have a description string.
      strcpy(errorStr, error.ErrorMessage());
      int nLen = lstrlen(errorStr);

      // Remove funny carriage return ctrl<M>.
      if (nLen > 2 && (errorStr[nLen - 2] == 0xd))
      {
         errorStr[nLen - 2] = '\0';
      }
   }
   else
   {
      strcpy(errorStr, desc);
   }

   printf("  Error Message = %s\n", (char*) errorStr);
}
```

Setting Up Simple Triggers

This example shows how to set up simple triggers using the SimpleTrigger (see page 196) method of the AnalyzerModule (see page 84) object.

Visual Basic

```
' When using Visual Basic outside of the Keysight Logic Analyzer
' application, you must create the Connect object (see
page 95) and use it
' to access the Instrument object.  In this example, "myInst"
' represents the Instrument object.
'
' When "using the Advanced Customization Environment (ACE)" (in the
online help),
```

```
' the Instrument object is already created and is globally
' accessible using "AgtLA".  In this example, substitute "myInst"
' with "AgtLA" to access the global Instrument object in VBA.

' Load the configuration file.
myInst.Open ("c:\LA\Configs\mpc860_demo_compare.ala")

' Declare trigger variables.
Dim mySimpleTriggers(2) As String
mySimpleTriggers(0) = "ADDR=hfff034d8"
mySimpleTriggers(1) = "ADDR=h00004088 And DATA=h46xxxxxx"
mySimpleTriggers(2) = "ADDR=h000041ad And DATA=h47xxxxxx"
Dim I As Integer

' Set up triggers using the SimpleTrigger method.
Dim myAnalyzer As AgtLA.AnalyzerModule
Set myAnalyzer = myInst.GetModuleByName("My 1690A-1")

For I = 0 To 2
   myAnalyzer.SimpleTrigger mySimpleTriggers(I)

   ' Run the measurement, wait for it to complete.
   myInst.Run
   myInst.WaitComplete (20)

   ' Process/display/store captured data.
Next
```

Visual C++

```
//
//  This simple Visual C++ Console application demonstrates how to use
//  simple triggers with the Keysight 168x/9x/9xx COM interface.
//
//  This project was created in Visual C++ Developer.  To create a
//  similar project:
//
//    - Execute File -> New
//    - Select the Projects tab
//    - Select "Win32 Console Application"
//    - Select A "hello,World!" application (Visual Studio 6.0)
//
//  To make this buildable, you need to specify your "import" path
//  in stdafx.h (search for "TODO" in that file).  For example, add:
//  #import "C:/Program Files/Keysight Technologies/Logic Analyzer/LA \
//  COM Automation/agClientSvr.dll"
//
//  To run, you need to specify the host logic analyzer to connect
//  to (search for "TODO" below).
//

#include "stdafx.h"


////////////////////////////////////////////////////////////////////
//
//  Forward declarations.
//
void DisplayError(_com_error& err);
```

```
////////////////////////////////////////////////////////////////////
//
//  main() entry point.
//
int main(int argc, char* argv[])
{
   printf("*** Main()\n");

   //
   //  Initialize the Microsoft COM/ActiveX library.
   //
   HRESULT hr = CoInitialize(0);

   if (SUCCEEDED(hr))
   {
      try {   // Catch any unexpected run-time errors.
         _bstr_t hostname = "mtx33";   // TODO, use your logic
                                       // analysis system hostname.
         printf("Connecting to instrument '%s'\n", (char*) hostname);

         // Create the connect object and get the instrument object.
         AgtLA::IConnectPtr pConnect =
               AgtLA::IConnectPtr(__uuidof(AgtLA::Connect));
         AgtLA::IInstrumentPtr pInst =
               pConnect->GetInstrument(hostname);

         // Load the configuration file.
         _bstr_t configFile = "C:\\LA\\Configs\\config.ala";
         printf("Loading the config file '%s'\n", (char*) configFile);
         pInst->Open(configFile, FALSE, "", TRUE);

         // Declare trigger variables.
         _bstr_t mySimpleTriggers[] = {
            "ADDR=hfff034d8",
            "ADDR=h00004088 And DATA=h46xxxxxx",
            "ADDR=h000041ad And DATA=h47xxxxxx"
         };

         // Set up triggers using the SimpleTrigger method.
         _bstr_t moduleName = "MPC860 Demo Board";
         AgtLA::IAnalyzerModulePtr pAnalyzer =
               pInst->GetModuleByName(moduleName);
         for (long i = 0; i < 3; i++)
         {
            printf("Trigger when '%s' occurs once, store anything.\n",
                  (char*) mySimpleTriggers[i]);
            pAnalyzer->SimpleTrigger(mySimpleTriggers[i], 1,
                  "Anything");

            // Run the measurement, wait for it to complete.
            pInst->Run(FALSE);
            pInst->WaitComplete(20);

            // Process/display/store captured data.
         }
```

```
      }
      catch (_com_error& e) {
         DisplayError(e);
      }

      // Uninitialize the Microsoft COM/ActiveX library.
      CoUninitialize();
   }
   else
   {
      printf("CoInitialize failed\n");
   }

   return 0;
}


//////////////////////////////////////////////////////////////////////
//
//  Displays the last error -- used to show the last exception
//  information.
//
void DisplayError(_com_error& error)
{
   printf("*** DisplayError()\n");

   printf("Fatal Unexpected Error:\n");
   printf("  Error Number = %08lx\n", error.Error());

   static char errorStr[1024];
   _bstr_t desc = error.Description();

   if (desc.length() == 0)
   {
      // Don't have a description string.
      strcpy(errorStr, error.ErrorMessage());
      int nLen = lstrlen(errorStr);

      // Remove funny carriage return ctrl<M>.
      if (nLen > 2 && (errorStr[nLen - 2] == 0xd))
      {
         errorStr[nLen - 2] = '\0';
      }
   }
   else
   {
      strcpy(errorStr, desc);
   }

   printf("  Error Message = %s\n", (char*) errorStr);
}
```

The SimpleTrigger (see page 196) method cannot set complex, multiple-step trigger sequences. To do that, you must set the AnalyzerModule (see page 84) object's Trigger (see page 240) property to an XML-format trigger specification string.

See Also

- Setting Up Advanced Triggers (see page 35)

Setting Up Advanced Triggers

This example shows how to set up advanced triggers by setting the Trigger (see page 240) property of the AnalyzerModule (see page 84) object to an XML-format trigger specification string.

Visual Basic

```
' When using Visual Basic outside of the Keysight Logic Analyzer
' application, you must create the Connect object (see
page 95) and use it
' to access the Instrument object.  In this example, "myInst"
' represents the Instrument object.
'
' When "using the Advanced Customization Environment (ACE)" (in the
online help),
' the Instrument object is already created and is globally
' accessible using "AgtLA".  In this example, substitute "myInst"
' with "AgtLA" to access the global Instrument object in VBA.

' Load the configuration file.
myInst.Open ("c:\LA\Configs\mpc860_demo_compare.ala")

' Declare trigger variables.
Dim myTriggerFiles(2) As String
myTriggerFiles(0) = "c:\LA\Triggers\TrigSpecFile0.xml"
myTriggerFiles(1) = "c:\LA\Triggers\TrigSpecFile1.xml"
myTriggerFiles(2) = "c:\LA\Triggers\TrigSpecFile2.xml"
Dim I As Integer

' Set triggers using the logic analyzer Trigger property.
Dim myAnalyzer As AgtLA.AnalyzerModule
Set myAnalyzer = myInst.GetModuleByName("My 1690A-1")
Dim myTrigger As String
Dim myTrigFileNum
myTrigFileNum = FreeFile

For I = 0 To 2
   ' Get trigger spec. from local file.
   Open myTriggerFiles(I) For Input As myTrigFileNum
   ' InputB copies bytes from a file into a variable.
   ' StrConv converts the ANSI string to a UNICODE string.
   myTrigger = StrConv(InputB(LOF(myTrigFileNum), myTrigFileNum), _
         vbUnicode)
   Close myTrigFileNum

   ' Set up the logic analyzer trigger.
   myAnalyzer.Trigger = myTrigger

   ' Or, to get trigger spec. from file on the
   ' instrument (and set the Trigger property):
   'myAnalyzer.RecallTriggerByFile (myTriggerFiles(I))

   ' Display the logic analyzer trigger specification.
   myTrigger = myAnalyzer.Trigger
   MsgBox myTrigger

   ' Run the measurement, wait for it to complete.
   myInst.Run
   myInst.WaitComplete (20)
```

```
   ' Process/display/store captured data.
Next
```

Visual C++

```
//
//  This simple Visual C++ Console application demonstrates how to use
//  advanced triggers with the Keysight 168x/9x/9xx COM interface.
//
//  This project was created in Visual C++ Developer.  To create a
//  similar project:
//
//    - Execute File -> New
//    - Select the Projects tab
//    - Select "Win32 Console Application"
//    - Select A "hello,World!" application (Visual Studio 6.0)
//
//  To make this buildable, you need to specify your "import" path
//  in stdafx.h (search for "TODO" in that file).  For example, add:
//  #import "C:/Program Files/Keysight Technologies/Logic Analyzer/LA \
//  COM Automation/agClientSvr.dll"
//
//  To run, you need to specify the host logic analyzer to connect
//  to (search for "TODO" below).
//

#include "stdafx.h"
#include <iostream>
#include <fstream>
#include <sstream>


////////////////////////////////////////////////////////////////////////
//
//  Forward declarations.
//
void DisplayError(_com_error& err);


////////////////////////////////////////////////////////////////////////
//
//  main() entry point.
//
int main(int argc, char* argv[])
{
   printf("*** Main()\n");

   //
   //  Initialize the Microsoft COM/ActiveX library.
   //
   HRESULT hr = CoInitialize(0);

   if (SUCCEEDED(hr))
   {
      try {   // Catch any unexpected run-time errors.
         _bstr_t hostname = "mtx33";   // TODO, use your logic
                                       // analysis system hostname.
         printf("Connecting to instrument '%s'\n", (char*) hostname);
```

```
   // Create the connect object and get the instrument object.
   AgtLA::IConnectPtr pConnect =
         AgtLA::IConnectPtr(__uuidof(AgtLA::Connect));
   AgtLA::IInstrumentPtr pInst =
         pConnect->GetInstrument(hostname);

   // Load the configuration file.
   _bstr_t configFile = "C:\\LA\\Configs\\config.ala";
   printf("Loading the config file '%s'\n", (char*) configFile);
   pInst->Open(configFile, FALSE, "", TRUE);

   // Declare trigger variables.
   _bstr_t myTriggerFiles[] = {
      "c:\\LA\\Triggers\\TrigSpecFile0.xml",
      "c:\\LA\\Triggers\\TrigSpecFile1.xml",
      "c:\\LA\\Triggers\\TrigSpecFile2.xml"
   };

   // Set up triggers using the SimpleTrigger method.
   _bstr_t moduleName = "MPC860 Demo Board";
   AgtLA::IAnalyzerModulePtr pAnalyzer =
         pInst->GetModuleByName(moduleName);
   for (long i = 0; i < 3; i++)
   {
      _bstr_t myTriggerSpec;

      // Get trigger spec. from local file.
      std::wifstream inFile(myTriggerFiles[i]);
      std::wstringstream inBuffer;   // Intermediate buffer.
      inBuffer << inFile.rdbuf();   // Read entire file.
      // Create bstr.
      myTriggerSpec = SysAllocString(inBuffer.str().c_str());

      // Set up the logic analyzer trigger.
      printf("Loading local trigger file '%s'\n",
            (char*) myTriggerFiles[i]);
      pAnalyzer->PutTrigger(myTriggerSpec);

      // Or, to load trigger spec. from instrument (and set the
      // Trigger property):
      //printf("Loading trigger from instrument '%s'\n",
      //      (char*) myTriggerFiles[i]);
      //pAnalyzer->RecallTriggerByFile(myTriggerFiles[i]);

      // Display the logic analyzer trigger specification.
      myTriggerSpec = pAnalyzer->GetTrigger();
      printf("XML trigger spec: '%s'\n", (char*) myTriggerSpec);

      // Run the measurement, wait for it to complete.
      pInst->Run(FALSE);
      pInst->WaitComplete(20);

      // Process/display/store captured data.
   }
}
catch (_com_error& e) {
```

```
            DisplayError(e);
         }

         // Uninitialize the Microsoft COM/ActiveX library.
         CoUninitialize();
      }
      else
      {
         printf("CoInitialize failed\n");
      }

      return 0;
}


////////////////////////////////////////////////////////////////////////
//
//  Displays the last error -- used to show the last exception
//  information.
//
void DisplayError(_com_error& error)
{
   printf("*** DisplayError()\n");

   printf("Fatal Unexpected Error:\n");
   printf("  Error Number = %08lx\n", error.Error());

   static char errorStr[1024];
   _bstr_t desc = error.Description();

   if (desc.length() == 0)
   {
      // Don't have a description string.
      strcpy(errorStr, error.ErrorMessage());
      int nLen = lstrlen(errorStr);

      // Remove funny carriage return ctrl<M>.
      if (nLen > 2 && (errorStr[nLen - 2] == 0xd))
      {
         errorStr[nLen - 2] = '\0';
      }
   }
   else
   {
      strcpy(errorStr, desc);
   }

   printf("  Error Message = %s\n", (char*) errorStr);
}
```

See Also

- Setting Up Simple Triggers (see page 31)

Changing the Sampling Mode

This example shows how to change the logic analyzer sampling mode by using XML-format strings with the Setup (see page 234) property of the AnalyzerModule (see page 84) object.

Visual Basic

```
' When using Visual Basic outside of the Keysight Logic Analyzer
' application, you must create the Connect object (see
page 95) and use it
' to access the Instrument object.  In this example, "myInst"
' represents the Instrument object.
'
' When "using the Advanced Customization Environment (ACE)" (in the
online help),
' the Instrument object is already created and is globally
' accessible using "AgtLA".  In this example, substitute "myInst"
' with "AgtLA" to access the global Instrument object in VBA.

' Create the logic analyzer object.
Dim myAnalyzer As AgtLA.AnalyzerModule
Set myAnalyzer = myInst.GetModuleByName("My 1690A-1")
Dim mySetup As String

' Set the timing (asynchronous) sampling mode.
Dim myTimingSamplingSetup As String
myTimingSamplingSetup = "<Module>" + _
  "<SamplingSetup>" + _
    "<Sampling ChannelMode='Full' MaxSpeed='400' " + _
      "SamplePeriod='2.5 ns' Type='Standard' Acquisition='Timing' " + _
      "AcquisitionDepth='256K' TriggerPosition='50'/>" + _
  "</SamplingSetup>" + _
"</Module>"
myAnalyzer.Setup = myTimingSamplingSetup

' Display the complete logic analyzer setup.
mySetup = myAnalyzer.Setup
MsgBox mySetup

' Set the state (synchronous) sampling mode.
Dim myStateSamplingSetup As String
myStateSamplingSetup = "<Module>" + _
  "<SamplingSetup>" + _
    "<Sampling ChannelMode='Full' Acquisition='State' " + _
      "AcquisitionDepth='256K' MaxSpeed='200' " + _
      "TriggerPosition='50'/>" + _
    "<StateClockSpec Mode='Master'>" + _
      "<Clear/>" + _
      "<Master>" + _
        "<ClockGroup>" + _
          "<Edges>" + _
            "<Edge PodIndex='1' Value='Rising'/>" + _
          "</Edges>" + _
          "<Qualifiers Operator='And'>" + _
            "<Qualifier Level='Low' PodIndex='2'/>" + _
          "</Qualifiers>" + _
        "</ClockGroup>" + _
      "</Master>" + _
    "</StateClockSpec>" + _
```

```
  "</SamplingSetup>" + _
"</Module>"
myAnalyzer.Setup = myStateSamplingSetup

' Display the complete logic analyzer setup.
mySetup = myAnalyzer.Setup
MsgBox mySetup
```

Visual C++

```
//
//  This simple Visual C++ Console application demonstrates
//  how to change the logic analyzer sampling mode with the
//  Keysight 168x/9x/9xx COM interface.
//
//  This project was created in Visual C++ Developer.  To create a
//  similar project:
//
//    - Execute File -> New
//    - Select the Projects tab
//    - Select "Win32 Console Application"
//    - Select A "hello,World!" application (Visual Studio 6.0)
//
//  To make this buildable, you need to specify your "import" path
//  in stdafx.h (search for "TODO" in that file).  For example, add:
//  #import "C:/Program Files/Keysight Technologies/Logic Analyzer/LA \
//  COM Automation/agClientSvr.dll"
//
//  To run, you need to specify the host logic analyzer to connect
//  to (search for "TODO" below).
//

#include "stdafx.h"


////////////////////////////////////////////////////////////////////////
//
//  Forward declarations.
//
void DisplayError(_com_error& err);


////////////////////////////////////////////////////////////////////////
//
//  main() entry point.
//
int main(int argc, char* argv[])
{
   printf("*** Main()\n");

   //
   //  Initialize the Microsoft COM/ActiveX library.
   //
   HRESULT hr = CoInitialize(0);

   if (SUCCEEDED(hr))
   {
      try {   // Catch any unexpected run-time errors.
         _bstr_t hostname = "mtx33";   // TODO, use your logic
```

```
                                    // analysis system hostname.
printf("Connecting to instrument '%s'\n", (char*) hostname);

// Create the connect object and get the instrument object.
AgtLA::IConnectPtr pConnect =
      AgtLA::IConnectPtr(__uuidof(AgtLA::Connect));
AgtLA::IInstrumentPtr pInst =
      pConnect->GetInstrument(hostname);

// Get the logic analyzer object.
_bstr_t moduleName = "My 16910A-1";
AgtLA::IAnalyzerModulePtr pAnalyzer =
      pInst->GetModuleByName(moduleName);

// Set the timing (asynchronous) sampling mode.
_bstr_t myTimingSamplingSetup = " \
   <Module> \
      <SamplingSetup> \
         <Sampling ChannelMode='Full' MaxSpeed='400' \
               SamplePeriod='2.5 ns' Type='Standard' \
               Acquisition='Timing' AcquisitionDepth='256K' \
               TriggerPosition='50'/> \
      </SamplingSetup> \
   </Module>";
pAnalyzer->PutSetup(myTimingSamplingSetup);

// Display the complete logic analyzer setup.
_bstr_t mySetup;
mySetup = pAnalyzer->GetSetup();
printf("Logic analyzer setup: '%s'\n", (char*) mySetup);

// Set the state (synchronous) sampling mode.
_bstr_t myStateSamplingSetup = " \
   <Module> \
      <SamplingSetup> \
         <Sampling ChannelMode='Full' Acquisition='State' \
               AcquisitionDepth='256K' MaxSpeed='200' \
               TriggerPosition='50'/> \
         <StateClockSpec Mode='Master'> \
            <Clear/> \
            <Master> \
               <ClockGroup> \
                  <Edges> \
                     <Edge PodIndex='1' Value='Rising'/> \
                  </Edges> \
                  <Qualifiers Operator='And'> \
                      <Qualifier Level='Low' PodIndex='2'/> \
                  </Qualifiers> \
               </ClockGroup> \
            </Master> \
         </StateClockSpec> \
      </SamplingSetup> \
   </Module>";
pAnalyzer->PutSetup(myStateSamplingSetup);

// Display the complete logic analyzer setup.
mySetup = pAnalyzer->GetSetup();
```

```
            printf("Logic analyzer setup: '%s'\n", (char*) mySetup);

         }
         catch (_com_error& e) {
            DisplayError(e);
         }

         // Uninitialize the Microsoft COM/ActiveX library.
         CoUninitialize();
      }
      else
      {
         printf("CoInitialize failed\n");
      }

      return 0;
   }


   ////////////////////////////////////////////////////////////////////
   //
   //  Displays the last error -- used to show the last exception
   //  information.
   //
   void DisplayError(_com_error& error)
   {
      printf("*** DisplayError()\n");

      printf("Fatal Unexpected Error:\n");
      printf("  Error Number = %08lx\n", error.Error());

      static char errorStr[1024];
      _bstr_t desc = error.Description();

      if (desc.length() == 0)
      {
         // Don't have a description string.
         strcpy(errorStr, error.ErrorMessage());
         int nLen = lstrlen(errorStr);

         // Remove funny carriage return ctrl<M>.
         if (nLen > 2 && (errorStr[nLen - 2] == 0xd))
         {
            errorStr[nLen - 2] = '\0';
         }
      }
      else
      {
         strcpy(errorStr, desc);
      }

      printf("  Error Message = %s\n", (char*) errorStr);
   }
```

Checking the Logic Analyzer Software Version

This example shows you how to check for the correct logic analyzer software version before using recently added objects, methods, and properties.

Visual Basic

```
Public Sub CheckVersion()
  Dim strVersion As String
  strVersion = AgtLA.VBAVersion

  bResult = DoesCurrentVersionMatchRequiredVersion("03.06.01")
End Sub

Private Function DoesCurrentVersionMatchRequiredVersion(ByVal _
      strRequiredVersion As String) As Boolean

  ' Get the version number, broken down into:
  '
  ' xx.yyy.zzz
  ' where xx is the major version
  '       yy is the minor version
  '       zz is the SubMinor version (which may not be present)
  '
  ' Example :
  ' 03.00.01 has major version 3, minor version 0, sub-minor version 1
  '
  ' If the Required Version is 03.00 and the current VBA Version is
  ' 02.80, then false is returned.  But, if the VBA Version is 03.01,
  ' then true is returned.

  Dim nRequiredMajor As Integer
  Dim nRequiredMinor As Integer
  Dim nRequiredSubMinor As Integer
  Dim nCurrentMajor As Integer
  Dim nCurrentMinor As Integer
  Dim nCurrentSubMinor As Integer

  ' If the two versions are identical, we're done.
  If (strRequiredVersion = AgtLA.Version) Then
    DoesCurrentVersionMatchRequiredVersion = True
    Exit Function
  End If

  Call GetNumbersForVersionString(strRequiredVersion, _
                                  nRequiredMajor, _
                                  nRequiredMinor, _
                                  nRequiredSubMinor)
  Call GetNumbersForVersionString(AgtLA.Version, _
                                  nCurrentMajor, _
                                  nCurrentMinor, _
                                  nCurrentSubMinor)

  ' Check Major Version first.
  If (nCurrentMajor > nRequiredMajor) Then
    DoesCurrentVersionMatchRequiredVersion = True
    Exit Function
  Else
    If (nCurrentMajor < nRequiredMajor) Then
      DoesCurrentVersionMatchRequiredVersion = False
      Exit Function
```

```
    End If
  End If

  ' Check Minor Version.
  If (nCurrentMinor > nRequiredMinor) Then
    DoesCurrentVersionMatchRequiredVersion = True
    Exit Function
  Else
    If (nCurrentMinor < nRequiredMinor) Then
      DoesCurrentVersionMatchRequiredVersion = False
      Exit Function
    End If
  End If

  ' Check SubMinor Version.
  If (nCurrentSubMinor > nRequiredSubMinor) Then
    DoesCurrentVersionMatchRequiredVersion = True
    Exit Function
  Else
    If (nCurrentSubMinor < nRequiredSubMinor) Then
      DoesCurrentVersionMatchRequiredVersion = False
      Exit Function
    End If
  End If
  DoesCurrentVersionMatchRequiredVersion = True
End Function

Private Sub GetNumbersForVersionString(ByVal strVersion As String, _
                                       ByRef nMajor As Integer, _
                                       ByRef nMinor As Integer, _
                                       ByRef nSubMinor As Integer)
  Dim nDash As Integer
  Dim nFirstPeriod As Integer
  Dim nSecondPeriod As Integer

  On Error GoTo invalidStr

  ' If there's a dash, eliminate.
  nDash = InStr(1, strVersion, "-")
  If (nDash > 0) Then
    strVersion = Mid(strVersion, 1, nDash - 1)
  End If

  ' Get the  Version first.  Put up a message if the string is wrong.
  nFirstPeriod = InStr(1, strVersion, ".")

  ' If there's no period, we need to exit.
  If (nFirstPeriod = 0) Then
    MsgBox "The version string " + strVersion + " is not valid.  " + _
           "Examples are 03.02.01 or 03.00."
    Exit Sub
  End If

  nSecondPeriod = InStr(nFirstPeriod + 1, strVersion, ".")
  nMajor = CInt(Mid(strVersion, 1, nFirstPeriod - 1))
  If (nSecondPeriod = 0) Then
    nMinor = CInt(Mid(strVersion, nFirstPeriod + 1, _
```

```
        Len(strVersion) - nFirstPeriod))
    nSubMinor = 0
  Else
    nMinor = CInt(Mid(strVersion, nFirstPeriod + 1, _
        nSecondPeriod - nFirstPeriod - 1))
    nSubMinor = CInt(Mid(strVersion, nSecondPeriod + 1, _
        Len(strVersion) - nSecondPeriod))
  End If

  Exit Sub

invalidStr:
  MsgBox "The version string " + strRequiredVersion + _
      " is not valid.  Examples are 03.02.01 or 03.00."

End Sub
```

Visual C++

```
//
//  This simple Visual C++ Console application demonstrates how to use
//  the Keysight 168x/169x/169xx COM interface to check the system
//  software version.
//
//  This project was created in Visual C++ Developer.  To create a
//  similar project:
//
//    - Execute File -> New
//    - Select the Projects tab
//    - Select "Win32 Console Application"
//    - Select A "hello,World!" application (Visual Studio 6.0)
//
//  To make this buildable, you need to specify your "import" path
//  in stdafx.h (search for "TODO" in that file).  For example, add:
//  #import "C:/Program Files/Keysight Technologies/Logic Analyzer/LA \
//  COM Automation/agClientSvr.dll"
//
//  To run, you need to specify the host logic analyzer to connect
//  to (search for "TODO" below).
//

#include "stdafx.h"
#include <string>
using namespace std;


////////////////////////////////////////////////////////////////////
//
//  Forward declarations.
//
boolean GetNumbersForVersionString(
  _bstr_t&   strVersion,
  long&      nMajor,
  long&      nMinor,
  long&      nSubminor);

boolean DoesCurrVersionMatch(
  _bstr_t&     strReqdVersion);
```

```
void DisplayError(_com_error& err);


//////////////////////////////////////////////////////////////////////
//
//  main() entry point.
//
int main(int argc, char* argv[])
{
   printf("*** Main()\n");

   //
   //  Initialize the Microsoft COM/ActiveX library.
   //
   HRESULT hr = CoInitialize(0);

   if (SUCCEEDED(hr))
   {
      _bstr_t strReqdVersion = "03.00.0001";
      if (DoesCurrVersionMatch(strReqdVersion)) {
         printf("Current version matches required '%s'\n",
               (char*) strReqdVersion);
      }
      else {
         printf("Current version does not match required '%s'\n",
               (char*) strReqdVersion);
      }

      // Uninitialize the Microsoft COM/ActiveX library.
      CoUninitialize();
   }
   else
   {
      printf("CoInitialize failed\n");
   }

   return 0;
}


//////////////////////////////////////////////////////////////////////
//
//  Given a version string, return major, minor, and subminor numbers.
//
boolean GetNumbersForVersionString(_bstr_t& version,
                                   long& nMajor,
                                   long& nMinor,
                                   long& nSubminor)
{
   string strVersion = version;
   string strMajor;
   string strMinor;
   string strSubminor;

   string::size_type nDash;
   string::size_type nFirstPeriod;
   string::size_type nSecondPeriod;
```

```
   // If there's a dash, eliminate from dash to end of string.
   nDash = strVersion.find("-");

   if (nDash != string::npos) {
      strVersion = strVersion.substr(0, nDash);
   }

   // Get the  Version first.  Put up a message if the string is wrong.
   nFirstPeriod = strVersion.find(".");

   // If there's no period, we need to exit.
   if (nFirstPeriod == string::npos) {
      printf("The version string '%s' is not valid.",
            strVersion.c_str());
      printf("  Examples are 03.02.01 or 03.00.\n");
      return (false);
   }

   strMajor = strVersion.substr(0, nFirstPeriod);
   nMajor = atol(strMajor.c_str());

   nSecondPeriod = strVersion.find(".", nFirstPeriod + 1);
   if (nSecondPeriod == string::npos) {   // No second period.
      strMinor = strVersion.substr(nFirstPeriod+1);
      nMinor = atol(strMinor.c_str());
      strSubminor = "";
      nSubminor = 0;
   }
   else {   // There is a second period.
      strMinor = strVersion.substr(nFirstPeriod+1,
            nSecondPeriod-nFirstPeriod-1);
      nMinor = atol(strMinor.c_str());
      strSubminor = strVersion.substr(nSecondPeriod+1);
      nSubminor = atol(strSubminor.c_str());
   }
   return (true);
}


//////////////////////////////////////////////////////////////////////
//
//  Returns true if the current system software version matches
//  the required version.
//
boolean DoesCurrVersionMatch(_bstr_t& strReqdVersion)
{
   // Get the version number, broken down into:
   //
   // xx.yyy.zzz
   // where xx is the major version
   //       yy is the minor version
   //       zz is the Subminor version (which may not be present)
   //
   // Example :
   // 03.00.01 has the major version 3, minor version 0, sub-minor
   // version 1
```

```
//
// If the Required Version is 03.00 and the current VBA Version is
// 02.80, then false is returned.  But, if the VBA Version is 03.01,
// then true is returned.

long nReqdMajor;
long nReqdMinor;
long nReqdSubminor;
long nCurrMajor;
long nCurrMinor;
long nCurrSubminor;

try {   // Catch any unexpected run-time errors.
   _bstr_t hostname = "mtx33";   // TODO, use your logic analysis
                                 // system hostname.
   printf("Connecting to instrument '%s'\n", (char*) hostname);

   // Create the connect object and get the instrument object.
   AgtLA::IConnectPtr pConnect =
         AgtLA::IConnectPtr(__uuidof(AgtLA::Connect));
   AgtLA::IInstrumentPtr pInst = pConnect->GetInstrument(hostname);

   // Get current system software version.
   _bstr_t strCurrVersion = pInst->GetVersion();

   // If the two versions are identical, we're done.
   if (strReqdVersion == strCurrVersion) {
      return (true);
   }

   // Get the individual numbers for the version string.
   if (!GetNumbersForVersionString(strReqdVersion, nReqdMajor,
         nReqdMinor, nReqdSubminor)) {
      return (false);
   }
   if (!GetNumbersForVersionString(strCurrVersion, nCurrMajor,
         nCurrMinor, nCurrSubminor)) {
      return (false);
   }

   // Check Major version first.
   if (nCurrMajor > nReqdMajor) {
      return (true);
   }
   else {
      if (nCurrMajor < nReqdMajor) {
         return (false);
      }
   }

   // Check Minor version next.
   if (nCurrMinor > nReqdMinor) {
      return (true);
   }
   else {
      if (nCurrMinor < nReqdMinor) {
         return (false);
```

```
         }
      }

      // Check Subminor version last.
      if (nCurrSubminor > nReqdSubminor) {
         return (true);
      }
      else {
         if (nCurrSubminor < nReqdSubminor) {
            return (false);
         }
      }

      // All numbers the same, return true.
      return (true);
   }
   catch (_com_error& e) {
      DisplayError(e);
      return (false);
   }
}


//////////////////////////////////////////////////////////////////////
//
//  Displays the last error -- used to show the last exception
//  information.
//
void DisplayError(_com_error& error)
{
   printf("*** DisplayError()\n");

   printf("Fatal Unexpected Error:\n");
   printf("  Error Number = %08lx\n", error.Error());

   static char errorStr[1024];
   _bstr_t desc = error.Description();

   if (desc.length() == 0)
   {
      // Don't have a description string.
      strcpy(errorStr, error.ErrorMessage());
      int nLen = lstrlen(errorStr);

      // Remove funny carriage return ctrl<M>.
      if (nLen > 2 && (errorStr[nLen - 2] == 0xd))
      {
         errorStr[nLen - 2] = '\0';
      }
   }
   else
   {
      strcpy(errorStr, desc);
   }

   printf("  Error Message = %s\n", (char*) errorStr);
}
```

Additional Visual Basic Examples

Visual Basic example projects can be found in your install directory. The default installation example directory is C:/Program Files/Keysight Technologies/Logic Analyzer/LA COM Automation/Visual Basic Examples.

Before running each example, read the documentation at the top of each source file for an explanation of how the logic analyzer must be set up before the example will run successfully.

Using Visual C++

This online help is geared mainly towards Visual Basic not Visual C++ programmers. Although you'll find the documentation is not directly applicable, the explanation of object, methods, properties and parameters can still be helpful.

Visual C++ Examples

Visual C++ example projects can be found in your install directory. The default installation example directory is C:/Program Files/Keysight Technologies/Logic Analyzer/LA COM Automation/Visual C++ Examples.

Before running each example, read the documentation at the top of each source file for an explanation of how the logic analyzer must be set up before the example will run successfully.

Simple Visual C++ Example

This example connects to the logic analyzer hardware and starts a measurement.

This C++ example uses COM smart pointers _comptr_t to integrate the ActiveX/COM automation server into the Visual C++ environment. The declaration of the Instrument specific smart pointers is in the "agClientSvr.tlh" header file which is automatically created and included when the instrument type library is imported using the #import directive.

NOTE For detailed method and property parameter types, see the "agClientSvr.tlh" header file. Note that Get/Put methods are generated for properties that you can get or set (as described in this online help). For example, the GetInstrument method in the following example accesses the Instrument (see page 224) property.

Using smart pointers is not the only way to integrate COM into the Visual C++ environment. For more details, refer to the Microsoft Visual C++ documentation.

```
// Import the Instrument Automation Server's type library.
// Replace <install_dir> with your installation directory.
// Default is:
//   C:/Program Files/Keysight Technologies/Logic Analyzer/LA COM
//   Automation/
#import "<install_dir>/agClientSvr.dll"

// Before using the Automation Server, initialize the COM/OLE
// libraries in your MFC application's InitInstance() method.
if (!AfxOleInit())
{
   ::AfxMessageBox("OLE initialization failed");
   return FALSE;
}

// If you're not using MFC, you should call
//CoInitialize(0)/CoUninitialize()

// For detailed method and property parameter types,
// see the header file "agClientSvr.tlh generated automatically
// by the #import directive in your project's configuration directory.

// Place the following C++ code in your class method.
try {
  // create the connect object and get the instrument
  AgtLA::IConnectPtr pConnect =
      AgtLA::IConnectPtr(__uuidof(AgtLA::Connect));
```

```
  AgtLA::IInstrumentPtr pInst = pConnect->GetInstrument("");
  // run all modules
  pInst->Run(FALSE);
}
catch (_com_error& e) {
   // Display any error messages returned.
   _bstr_t msg(e.Description());
   if (msg.length() == 0)
      msg = e.ErrorMessage();
   ::AfxMessageBox(msg);
}
```

Using LabVIEW

Tutorial - To programmatically control the logic analyzer in LabVIEW

Descriptions of the basic LabVIEW interface, its operation, and general use is not covered here. Refer to your LabVIEW online help for this information. The following steps are intended only as a guideline.

LabVIEW 8.0

1 Open the logic analyzer Connect object:

a In the Labview Front Panel, go to the Refnum and choose Automation Refnum.

b Right click select "ActiveX" class, choose browse.

c Select Object from Type library dialog, click/select "show creatable objects only" box.

d Choose "Keysight 168x/169x/169xx Logic Analyzer Object Library Version 1.0".

e Choose the "Connect(AgtLA.Connect.1)" object.

2 Get the logic analyzer Instrument Object:

a In the LabVIEW block diagram, go to the "Function" Palette and choose "Connectivity" then "ActiveX".

b Inside the "ActiveX" palette, drag the "Invoke Node" icon into the window.

c Press the "Connect Wire" button in the "Tools" Palette and connect the "Automation Open" icon's "Automation Refnum" output to the "Invoke Node" icon's "reference" input. The "Invoke Node" name displayed is now "IConnect".

d Right click on the "IConnect" icon and choose Methods->Instrument

e Connect a String Constant to the "HostNameOrIPAddress".

f The output of the "Instrument" method is an "IInstrument" object. Use this object to call the instrument's methods and properties.

3 Call a logic analyzer Instrument object method:

a In the LabVIEW diagram window, go to the "Function" Palette and choose "Communication", then "ActiveX".

b Inside the "ActiveX" palette, drag the "Invoke Node" icon onto the window.

c Press the "Connect Wire" button in the "Tools" Palette and connect the "IConnect" icon's "Instrument" method output to the "Invoke Node" icon's "reference" input. The "Invoke Node" name displayed is now "IInstrument".

d Right-click on the "IInstrument" icon and choose "Methods" to call any method.

4 Call a logic analyzer Instrument object property:

a In the LabVIEW diagram window, go to the "Function" Palette and choose "Communication", then "ActiveX".

b Inside the "ActiveX" palette, drag the "Property Node" icon onto the window.

c Press the "Connect Wire" button in the "Tools" Palette and connect the "IConnect" icon's "Instrument" method output to the "Property Node" icon's "reference" input. The "Property Node" name displayed is now "IInstrument".

d Right-click on the "IInstrument" icon and choose "Properties" to call any property.

LabVIEW 6.0

NOTE The process documented here assumes you are using LabVIEW 6.0. This process may change for different versions of LabVIEW.

1 Open the logic analyzer Connect object:
   a In the LabVIEW diagram window, go to the "Function" Palette and choose "Communication", then "ActiveX".
   b Inside the "ActiveX" palette, drag the "Automation Open" icon onto the window.
   c Right-click on the "Automation Open" icon and choose "Select ActiveX Class"; then, choose "Browse...".
   d The Select Object From Type Library dialog will be displayed.
   e Choose "Keysight 168x/169x/169xx Logic Analyzer Object Library Version 1.0".
   f Choose the "Connect (AgtLA.Connect.1)" object.
2 Get the logic analyzer Instrument object:
   a In the LabVIEW diagram window, go to the "Function" Palette and choose "Communication", then "ActiveX".
   b Inside the "ActiveX" palette, drag the "Invoke Node" icon onto the window.
   c Press the "Connect Wire" button in the "Tools" Palette and connect the "Automation Open" icon's "Automation Refnum" output to the "Invoke Node" icon's "reference" input. The "Invoke Node" name displayed is now "IConnect".
   d Right click on the "IConnect" icon and choose Methods->Instrument
   e Connect a String Constant to the "HostNameOrIPAddress".
   f The output of the "Instrument" method is an "IInstrument" object. Use this object to call the instrument's methods and properties.
3 Call a logic analyzer Instrument object method:
   a In the LabVIEW diagram window, go to the "Function" Palette and choose "Communication", then "ActiveX".
   b Inside the "ActiveX" palette, drag the "Invoke Node" icon onto the window.
   c Press the "Connect Wire" button in the "Tools" Palette and connect the "IConnect" icon's "Instrument" method output to the "Invoke Node" icon's "reference" input. The "Invoke Node" name displayed is now "IInstrument".
   d Right-click on the "IInstrument" icon and choose "Methods" to call any method.
4 Call a logic analyzer Instrument object property:
   a In the LabVIEW diagram window, go to the "Function" Palette and choose "Communication", then "ActiveX".
   b Inside the "ActiveX" palette, drag the "Property Node" icon onto the window.
   c Press the "Connect Wire" button in the "Tools" Palette and connect the "IConnect" icon's "Instrument" method output to the "Property Node" icon's "reference" input. The "Property Node" name displayed is now "IInstrument".
   d Right-click on the "IInstrument" icon and choose "Properties" to call any property.

See the LabVIEW examples (see page 54) for a detailed view of how to use Invoke and Property Nodes.

LabVIEW Examples

LabVIEW examples can be found in your install directory. The default installation example directories are:

- C:/Program Files/Keysight Technologies/Logic Analyzer/LA COM Automation/LabVIEW 6.0 Examples
- C:/Program Files/Keysight Technologies/Logic Analyzer/LA COM Automation/LabVIEW 7.0 Examples

Using Perl

1 Install the Perl software.

2 Copy and paste the example code below into a file (PrintLAData.pl).

3 Run the example from the Command Prompt by entering the command: "perl PrintLAData.pl".

Example

```
#
# This Perl example prints all of the bus/signal's from the
# first module in a 168x/9x/9xx Logic Analysis System.
#
#   $LAHostNameOrIP -> change to the hostname or IP address of the LA
#                      you're connecting to (default is 'localhost'
#                      if you're running Perl directly on the LA)
#   $LAAnalyzer     -> change to the analyzer name to transfer data
#                      from (default is the first module)
#   $LAStartRange, $LAEndRange -> change to the data range to upload
#                      (default is -10 and 10 respectively)
#
# This example was tested using ActiveState Perl version 5.6.1


# when using strict, declare *all* globals
use strict qw(vars refs subs);

# libraries needed to interface with the Logic Analyzer COM interface
use Win32::OLE;
use Win32::OLE::Variant;
use Win32::OLE::Const;

### ======================================================================
###                       * Begin Subroutines *
### ----------------------------------------------------------------------

##-----------------------------------------------------------------------
## FUNCTION:
##   PrintArrays -- prints the Logic Analyzer Data Arrays
##
## SYNOPSIS:
##
## ARGUMENTS:
##   arrays - array of data arrays to format and print.  The
##            first array contains the bus/signal names.
##
##-----------------------------------------------------------------------

sub PrintArrays
{
  my @arrays = @_;

  my @nameArray = @{$arrays[0]};

  # Calculate the max width for each column and store in an array
  my @maxWidthArray;

  print("\n");
```

```
  for my $i ( 1 .. $#arrays )
  {
    my $maxlen = length($nameArray[$i-1]);
    for my $j ( 0 .. $#{ $arrays[1] } )
    {
      my $data = $arrays[$i][$j];
      if (length($data) > $maxlen) {
        $maxlen = length($data);
      }
    }
    push(@maxWidthArray, $maxlen);
  }

  # Print the header row
  for my $i ( 0 .. $#nameArray )
  {
    my $hdr = $nameArray[$i];
    my $firstSpaces = ($maxWidthArray[$i] - length($hdr))/2;
    print "  " . " " x $firstSpaces;
    print $hdr;
    print " " x ($maxWidthArray[$i] - length($hdr) - $firstSpaces);
  }
  print "\n";
  for my $i ( 0 .. $#nameArray )
  {
    print "  " . "-" x $maxWidthArray[$i];
  }
  print "\n";

  # Print the data rows
  for my $i ( 0 .. $#{ $arrays[1] } )
  {
    for my $j ( 1 .. $#arrays )
    {
      my $data = $arrays[$j][$i];
      print "  " . " " x ($maxWidthArray[$j-1] - length($data)) . $data;
    }
    print "\n";
  }
}

### ------------------------------------------------------------------
###                         End of Subroutines
### ==================================================================

### ==================================================================
###                       * Begin Main Routine *
### ------------------------------------------------------------------

# Logic Analyzer host name or IP address
my $LAHostNameOrIP = "localhost";

# Create the logic analyzer client server
my $LAConnect = Win32::OLE->new('AgtLA.Connect');
if (! $LAConnect)
{
  print ("Connection failed: ");
```

```
  print ("please install the LA COM Automation client software\n");
  exit 1;
}

# Get the typedef constants
my $LAConstants = Win32::OLE::Const->Load($LAConnect);

# Connect to the remote logic analyzer instrument
print("\nConnecting to '$LAHostNameOrIP'\n");
my $LAInst = $LAConnect->Instrument($LAHostNameOrIP);
if (Win32::OLE->LastError != 0)
{
  print("Connection failed: ");
  print("please verify the LA hostname or IP address ");
  print("'$LAHostNameOrIP'\n");
  exit 1;
}

# Optionally load a configuration file that exists on the logic
# analyzer.  If the file only exists on your client PC, then use the
# $LAConnect->CopyFile() method to copy the file onto your logic
# analyzer
#
# $LAInst->Open("test.xml");

# Run the analyzer and wait for the measurement to complete before
# getting data
$LAInst->Run();
$LAInst->WaitComplete(10);  # time out after 10 seconds

# Get the first module's data
my $LAAnalyzer = $LAInst->Modules(0);

#
# Get the module's bus/signal names and store into 'LANameArray'
#
my $LABusSignals = $LAAnalyzer->BusSignals();
my $LABusSignalsCount = $LABusSignals->count;
my @LANameArray;
my @LADataArrays;
my $numRows = Variant(VT_I4 | VT_BYREF, 0);
my $LAStartRange = -10;
my $LAEndRange = 10;

foreach my $index (0..$LABusSignalsCount-1)
{
  my $name = $LABusSignals->Item($index)->Name;
  push(@LANameArray, $name);
}
push (@LADataArrays, [@LANameArray]);

#
# Get the module's bus/signal data and store into 'LADataArrays'
#
foreach my $index (0..$LABusSignalsCount-1)
{
  my $LAData = $LABusSignals->Item($index)->BusSignalData;
```

```
  my $LABusSignalType = $LABusSignals->Item($index)->BusSignalType();
  my $LADataType = $LAConstants->{AgtDataLong};

  if ($LABusSignalType == $LAConstants->{AgtBusSignalTime})
  {
    $LADataType = $LAConstants->{AgtDataTime};
  }

  my $LADataArray = $LAData->GetDataBySample($LAStartRange,
      $LAEndRange, $LADataType, $numRows);
  push(@LADataArrays, $LADataArray);
}

#
# Print the Arrays
#
PrintArrays(@LADataArrays);
```

Using Python

1 Install the Python and Python for Windows extension software.

2 Set up early binding for COM objects by running the MakePy utility. MakePy is a normal Python module that lives in the *win32com\client* directory of the PythonCOM package. There are two ways to run this script:

- Start PythonWin, and from the Tools menu, select the item COM Makepy utility.
- Using the Windows Explorer, locate the *client* subdirectory under the main *win32com* directory and double-click the file *makepy.py*.

In both cases, you are presented with a list of objects MakePy can use to support early binding. Select Keysight 168x/169x/169xx Logic Analyzer Object Library and click OK.

3 Copy and paste the example code below into a file (PrintLAData.py).

4 Run the example from the Command Prompt by entering the command: "python PrintLAData.py".

Example

```
#
# This Python example prints all of the bus/signal's from the
# first module in a 168x/9x/9xx Logic Analysis System.
#
#   LAHostNameOrIP -> change to the hostname or IP address of the LA
#                     you're connecting to (default is 'localhost'
#                     if you're running Python directly on the LA)
#   LAModule       -> change to the analyzer name to transfer data from
#                     (default is the first module)
#   LAStartRange, LAEndRange -> change to the data range to upload
#                       (default is -10 and 10 respectively)
#
# This example was tested using Python version 2.2.3 and
# the Python for Windows extensions build 200.

import sys
import string

# Libraries needed to interface with the Logic Analyzer COM interface.
import win32com.client
from win32com.client import constants
import pythoncom

### ======================================================================
###                       * Begin Subroutines *
### ----------------------------------------------------------------------

##-----------------------------------------------------------------------
## FUNCTION:
##   PrintArrays -- prints the Logic Analyzer Data Arrays
##
## SYNOPSIS:
##
## ARGUMENTS:
##   arrays - array of data arrays to format and print.  The
##            first array contains the bus/signal names.
##
##-----------------------------------------------------------------------

def PrintArrays(arrays):
```

```
  NameArray = arrays[0]
  TypeArray = arrays[1]
  DataArrays = arrays[2:]
  DataStringArrays = []

  # Calculate the max width for each column and store in an array.
  MaxWidthArray = []
  for name in NameArray:
    MaxWidthArray.append(len(name))

  for column in range(len(DataArrays)):
     DataStringArray = []
     for dataValue in DataArrays[column]:
       if TypeArray[column] == constants.AgtBusSignalProbed:
         dataValueString = "%X" % dataValue
       elif TypeArray[column] == constants.AgtBusSignalGenerated:
         dataValueString = "%s" % dataValue
       elif TypeArray[column] == constants.AgtBusSignalSampleNum:
         dataValueString = "%d" % dataValue
       elif TypeArray[column] == constants.AgtBusSignalTime:
         dataValueString = "%E" % dataValue
       DataStringArray.append(dataValueString)
       dataValueStringLength = len(dataValueString)
       if dataValueStringLength > MaxWidthArray[column]:
         MaxWidthArray[column] = dataValueStringLength
     DataStringArrays.append(DataStringArray)

  # Print the header row.
  print ""
  for column in range(len(NameArray)):
    print "  " + string.center(NameArray[column], \
        MaxWidthArray[column]),
  print ""
  for column in range(len(NameArray)):
    print "  " + "-" * MaxWidthArray[column],
  print ""

  # Print the data rows.
  for row in range(len(DataStringArrays[1])):
    for column in range(len(DataStringArrays)):
      print "  " + string.rjust(DataStringArrays[column][row], \
          MaxWidthArray[column]),
    print ""

### ------------------------------------------------------------------
###                         End of Subroutines
### ==================================================================

### ==================================================================
###                      * Begin Main Routine *
### ------------------------------------------------------------------

# Logic Analyzer host name or IP address.
LAHostNameOrIP = "localhost"

# Create the logic analyzer client server, and
# connect to the remote logic analyzer instrument.
```

```
print "\nConnecting to '%s'" % LAHostNameOrIP ;
try:
  LAConnect = win32com.client.Dispatch("AgtLA.Connect")
  LAInst = LAConnect.GetInstrument(LAHostNameOrIP)
except pythoncom.com_error, (hr, msg, exc, arg):
  print "The AgtLA call failed with code: %d: %s" % (hr, msg)
  if exc is None:
    print "There is no extended error information"
  else:
    wcode, source, text, helpFile, helpId, scode = exc
    print "The source of the error is", source
    print "The error message is", text
    print "More info can be found in %s (id=%d)" % (helpFile, helpId)
  sys.exit(1)

# Optionally, load a configuration file that exists on the
# logic analyzer.  If the file only exists on your client PC,
# then use the LAConnect.CopyFile() method to copy the file
# onto your logic analyzer.
#
# LAInst.Open("test.xml")

# Get the logic analyzer module.
#
# LAModule = LAInst.GetModuleByName("My 1691D-1")
LAModule = LAInst.Modules(0)

# Optionally, set up a trigger before running the analyzer.
#
# if LAModule.Type == "Analyzer":
#   LAAnalyzerModule = \
#       win32com.client.CastTo(LAModule, "IAnalyzerModule")
#   LAAnalyzerModule.SimpleTrigger("My Bus 1=hff")

# Run the analyzer and wait for the measurement to complete
# before getting data.
LAInst.Run()
LAInst.WaitComplete(10)   # Time out after 10 seconds.

# Get the module's bus/signal names and types, and store
# into 'LABusSignalNameArray' and 'LABusSignalTypeArray'.
LABusSignals = LAModule.BusSignals
LABusSignalsCount = LABusSignals.Count
LABusSignalNameArray = []
LABusSignalTypeArray = []

for index in range(LABusSignalsCount):
  LABusSignalName = LABusSignals.Item(index).Name
  LABusSignalType = LABusSignals.Item(index).BusSignalType
  LABusSignalNameArray.append(LABusSignalName)
  LABusSignalTypeArray.append(LABusSignalType)

# Get the module's bus/signal data and store into 'LADataArrays'.
LADataArrays = []
LADataArrays.append(LABusSignalNameArray)
LADataArrays.append(LABusSignalTypeArray)
LAStartRange = -10
```

```
LAEndRange = 10

for index in range(LABusSignalsCount):
  LAData = LABusSignals.Item(index).BusSignalData
  LABusSignalType = LABusSignalTypeArray[index]
  LADataType = constants.AgtDataLong

  if LABusSignalType == constants.AgtBusSignalTime:
    LADataType = constants.AgtDataTime

  if LAData.Type == "Sample":
    SampleBusSignalData = \
        win32com.client.CastTo(LAData, "ISampleBusSignalData")
    (LADataArray, NumRows) = \
        SampleBusSignalData.GetDataBySample(LAStartRange,
                                            LAEndRange,
                                            LADataType)
    LADataArrays.append(LADataArray)

#
# Print the Arrays.
#
PrintArrays(LADataArrays)
```

Using Tcl

1 Install the Tcl software.

2 Copy and paste the example code below into a file (PrintLAData.tcl).

3 Run the example from the Command Prompt by entering the command: "tclsh.exe PrintLAData.tcl".

Example

```
#
# This Tcl example prints all of the bus/signal's from the
# first module in a 168x/9x/9xx Logic Analysis System.
#
#  This example was tested using ActiveState ActiveTcl 8.4.5.0
#

set usage "16900.tcl \[-e\] \[-f <hostname or IP>\] \[-c <config file>\]
Does a simple run command to the specified 16900 frame
-e : print out interface information
-f : specify the frame name on the command line
-c : specify a config file to load (optional)
";

package require cmdline;   # argument processing
package require tcom;      # Use the ActiveState tcom package

### ================================================================
###                      * Begin Procedures *
### ----------------------------------------------------------------

##-----------------------------------------------------------------
##  Procedure to explore COM interfaces
##-----------------------------------------------------------------

proc explore_tcom {handle} {
   #  Explore the handle we got back....
   set ihandle [ ::tcom::info interface $handle ];
   set iname [ $ihandle name ];
   puts [ concat "Interface name: " $iname ];

   set methodlist [ $ihandle methods ];

   puts [ concat "There are " [ llength $methodlist ] \
         " elements in the method list" ];

   set index 0;
   while { [ llength $methodlist] > $index } {
      set one [lindex $methodlist $index];

      set memberid [ lindex $one 0 ];
      set returntype [ lindex $one 1 ];
      set methodname [ lindex $one 2 ];
      set parmlist [ lindex $one 3 ];
      puts [ concat "name: " $methodname ", memberid: " $memberid ", \
            parmlist " $parmlist ];

      set index [ expr $index + 1 ];
   }
```

```
   #  Explore properties of the handle
   set proplist [ $ihandle properties ];

   puts [ concat "\nThere are " [ llength $proplist ] \
         " elements in the properties list" ];

   set index 0;
   while { [ llength $proplist] > $index } {
      set one [lindex $proplist $index];

      set memberid [ lindex $one 0 ];
      set rwmode [ lindex $one 1 ];
      set datatype [ lindex $one 2 ];
      set propname [ lindex $one 3 ];
      set descriptions [ lindex $one 4 ];
      puts [ concat "name: " $propname ", memberid: " $memberid ", \
            rwmode " $rwmode ", datatype: " $datatype ];

      set index [ expr $index + 1 ];
   }
}; # explore_tcom

### ------------------------------------------------------------------
###                          End of Procedures
### ==================================================================

### ==================================================================
###                       * Begin Main Routine *
### ------------------------------------------------------------------

set framename "empty";           # No default frame name
set configfile "";
set exploreinterfaces 0;

# Check command line arguments
while {[ ::cmdline::getopt argv {"e" "f.arg" "c.arg"} c valvar ] > 0} {
   switch $c \
      "c"         { set configfile $valvar} \
      "e"         { set exploreinterfaces 1}\
      "f"         { set framename $valvar} \
      "default"   { puts $usage; exit 1; } ;
}; # while statement


# Ask for the hostname or IP address of the 16900 frame
if {$framename == "empty"} {
   puts "What is the hostname or IP of the 16900 frame? ";
   set framename [ gets stdin ];
};

puts "Connecting to '$framename'";

# Open the connection to the logic analyzer
set lahandle [ ::tcom::ref createobject "AgtLA.Connect" ];
if {$lahandle == 0} {
   puts "Error opening AgtLA.Connect";
```

```
   exit 1;
}

if {$exploreinterfaces == 1 } {
   puts "******************************
   AgtLA.Connect handle information:
   ";
   explore_tcom $lahandle;
   puts "******************************";
}

# Attach to the frame....
set laframe [ $lahandle Instrument $framename];

if {$exploreinterfaces == 1 } {
   puts "******************************
   Instrument handle information:
   ";
   explore_tcom $laframe;
   puts "******************************";
}

# If they specified a config file, load it
if {$configfile ne ""} {
   set openreturn [ $laframe Open $configfile 0];
   puts [ concat "Open returned " $openreturn ];
}

# Do the run command
$laframe Run 0;      # Non repetitive run

# Wait for the run to finish
$laframe WaitComplete 10;  # Wait until meas complete or 10 seconds

#  Get the first analyzer's data
set analyzers [ $laframe Modules ];

if {$exploreinterfaces == 1 } {
   puts "******************************
   Analyzers handle information:
   ";
   explore_tcom $analyzers;
   puts "******************************";
}

# In order to pass an integer to the COM object, must
# force the internal representation to an integer using
# the following two lines:
#
set intval -1;
incr intval;
set analyzer [ $analyzers Item $intval ];

if {$exploreinterfaces == 1 } {
   puts "******************************
   analyzer handle information:
   ";
```

```
   explore_tcom $analyzer;
   puts "******************************";
}


#  Get the first analyzer's bus/signal names
set bus_signal_names [ $analyzer BusSignals ];

if {$exploreinterfaces == 1 } {
   puts "******************************
   bus_signal_names handle information:
   ";
   explore_tcom $bus_signal_names;
   puts "******************************";
}

#  Walk through the bus/signal names.  Find out:
#     type of data (probed, samplenum, time)
#     max width of column (max of bus/signal name and printed value)
#
set num_bus_signal_names [$bus_signal_names Count];
set index -1;
incr index;       # Force to be integer 0
while {$index < $num_bus_signal_names} {
   set bus_signal_name [$bus_signal_names Item $index];

   if {$exploreinterfaces == 1 && $index == 0} {
      puts "******************************
      bus_signal_name handle information:
      ";
      explore_tcom $bus_signal_name;
      puts "******************************";
   }


   set name [$bus_signal_name Name];
   set namewidth [expr [string length $name] + 1];

   set datahandle [$bus_signal_name BusSignalData];

   if {$exploreinterfaces == 1 && $index == 0} {
      puts "******************************
      data handle information:
      ";
      explore_tcom $datahandle;
      puts "******************************";
   }

   set bits [$bus_signal_name BitSize];

   # The bustype is an integer. For each type, convert to the type
   # of print-out we want
   set bustype [$bus_signal_name BusSignalType];


   switch $bustype {
      1        {  #AgtBusSignalProbed
```

```
                  set datatype 6;   # StringHex
                  set bitwidth [expr $bits / 4 + 1];
               }
      2        {  # AgtBusSignalGenerated
                  set datatype 7;   # DataString
                  set bitwidth 30;  # Arbitrary....
               }

      3        {  # AgtBusSignalSampleNum
                  set datatype 3;   # StringDecimal
                  set bitwidth [expr $bits / 10 + 1 ];
               }
      4        {  # AgtBusSignalTime
                  set datatype 4;   # DataTime
                  set bitwidth 30;  # Arbitrary....
               }
      }



   set width $namewidth;
   if {$width < $bitwidth} {set width $bitwidth};


   lappend bus_signal_info $name $bits $width $datatype $datahandle;
   puts "$name: $bits bits, $width width, $datatype datatype";

   incr index;
}

#  Print out the bus/signal names,
foreach {name bits width datatype datahandle} $bus_signal_info {
   puts -nonewline [ format "%*s " $width $name ];
}
puts "";

#  The most efficient way to get data is to get a large
#  chunk of data for the first bus/signal name, then the next, and
#  so on.  For the purposes of this example, just grab
#  one sample at a time and go across the row....
#
for {set i 0} {$i < 10} {incr i} {
   foreach {name bits width datatype datahandle} $bus_signal_info {
      set value [$datahandle GetDataBySample $i $i $datatype numrows];
      puts -nonewline [ format "%*s " $width $value ];
   }
   puts "";
}
```

4 COM Automation Reference

Objects, Methods, and Properties Quick Reference

[Automation Home (see page 3)] [Objects]

Objects	Methods/Properties	Description
AnalyzerModule (see page 84)		A state/timing analyzer hardware measurement module.
methods	GetRawData (see page 169)	Given a range, returns the raw analyzer data.
	GetRawTimingZoomData (see page 170)	Given a range, returns the raw analyzer timing zoom data.
	RecallTriggerByName (see page 189)	Loads a named trigger from the recall buffer.
	RecallTriggerByFile (see page 188)	Loads a previously saved trigger file on the instrument file system.
	SimpleTrigger (see page 196)	Trigger on a simple condition with optional occurrence and storage qualification.
	WaitComplete (see page 200)	Waits until the analyzer module, tool, and viewer measurements are complete.
properties	Setup (see page 234)	Gets or sets the logic analyzer's XML-format setup specification.
	Trigger (see page 240)	Gets or sets the logic analyzer's XML-format trigger specification.
BusSignal (see page 85)		A named and grouped set of pod channels.
methods	IsTimingZoom (see page 181)	Is this a timing zoom bus/signal?
properties	Activity (see page 207)	Gets the activity indicators of the bus/signal.
	BitSize (see page 210)	Gets the number of channels in the bus/signal.
	BusSignalData (see page 211)	Gets the acquisition data associated with a bus/signal.
	BusSignalType (see page 211)	Gets the type of bus/signal.
	ByteSize (see page 212)	Gets the size of the bus/signal in bytes.
	Channels (see page 213)	Gets the channels defined in the bus/signal.
	CreatorName (see page 219)	Gets the name of the module, tool, or viewer that created this bus/signal.
	Name (see page 227)	Gets or sets the name of the bus/signal.
	Polarity (see page 230)	Gets the polarity of the bus/signal.
	Symbols (see page 238)	Gets or sets the symbols associated with a bus/signal.
BusSignalData (see page 86)		A generic bus/signal data object.
properties	Type (see page 241)	Gets the specific bus/signal data type.
BusSignalDifference (see page 86)		Represents the different values for a particular bus/signal within a sample that has differences.
properties	Name (see page 227)	Gets the bus/signal name associated with the sample difference.
	Reference (see page 231)	Gets the reference buffer value associated with the sample difference.
	Value (see page 242)	Gets the data value associated with the sample difference.

Objects	Methods/Properties	Description
BusSignalDifferences (see page 86)		A collection object that contains all of the SampleDifference object's buses/signals with differences.
properties	_NewEnum (see page 244)	Used by Visual Basic to support the implementation of **For Each ... Next**.
	Count (see page 216)	Gets the number of bus/signal differences in the collection.
	Item (see page 224)	Given an index into the collection, gets a BusSignalDifference (see page 86) object from the collection.
BusSignals (see page 90)		A collection of the hardware module's defined BusSignals.
methods	Add (see page 142)	Adds a new bus/signal to the collection.
	Remove (see page 190)	Removes a bus/signal from the collection.
properties	_NewEnum (see page 244)	Used by Visual Basic to support the implementation of **For Each ... Next**.
	Count (see page 216)	Gets the number of BusSignal (see page 85) objects in the collection.
	Item (see page 224)	Gets one of the BusSignal (see page 85) objects in the collection given either an index or name.
CompareWindow (see page 95)		A window that compares bus/signal data.
methods	Execute (see page 151)	Executes the compare using the current options.
properties	Options (see page 229)	Gets or sets the Compare window options.
	SampleDifferences (see page 233)	Gets a collection of all the samples with differences found in the last comparison.
Connect (see page 95)		A connection to the logic analyzer instrument.
methods	CopyFile (see page 146)	Copies a file to the instrument file system.
	GetRemoteInfo (see page 171)	Gets the logic analyzer's remote user login and computer name.
properties	Instrument (see page 224)	Gets the logic analyzer instrument object.
ConnectSystem (see page 95)		A connection to the logic analyzer system.
methods	Connect (see page 146)	Connects to the remote logic analyzer system.
	RecvFile (see page 189)	Copies a file from the remote logic analyzer system to your local system.
	SendFile (see page 193)	Copies a file from your local system to the remote logic analyzer system.
Exerciser (see page 96) For a detailed description of its methods, refer to the *Using COM Commands for U4421A Module* section in the *U4421A D-PHY Analyzer and Exerciser* online help.		A hardware measurement module for sending defined stimulus to a DUT.

Objects	Methods/Properties	Description
methods	ApplyToHardware(string cmd)	Applies the stimulus related settings loaded in the Setup dialog box to the stimulus hardware module.
	ExecuteCommand(string cmd, out string result)	Loads the specified stimulus settings to the Setup dialog box of the hardware module in the Logic and Protocol Analyzer GUI. In addition, the command also immediately applies these settings to the hardware module even when the module is in the Running state. The command is useful for changing stimulus settings of the module at runtime and for inserting packets dynamically.
	GetXmlFormat(string cmdKey, out string currentSettings)	Returns the XML command format for the given command name.
	LoadExerciserParameters(string cmd, out string result)	Loads the stimulus related settings for the hardware module to the Setup dialog box of the module in the Logic and Protocol Analyzer GUI.
	StartExerciser	Starts the transmission of stimulus from the hardware module to a DUT.
	StopExerciser	Stops the transmission of stimulus from the hardware module to a DUT.
FindResult (see page 97)		Gets the results from the Find (see page 154), FindNext (see page 158), and FindPrev (see page 159) method calls.
properties	Found (see page 222)	Gets the found status.
	OccurrencesFound (see page 228)	Gets the number of occurrences found.
	SubrowFound (see page 237)	Gets the subrow number if found on a subrow.
	TimeFound (see page 239)	Gets the time found as a double.
	TimeFoundString (see page 239)	Gets the time found as a string.
Frame (see page 97)		A logic analyzer frame.
properties	ComputerName (see page 216)	Gets the computer name of the logic analyzer frame.
	Description (see page 220)	Gets a description of the logic analyzer frame.
	IPAddress (see page 224)	Gets the frame's IP address(es).
	TargetControlPort (see page 238)	Gets or sets the target control port value.
Frames (see page 98)		A collection of logic analyzer frames connected via the multiframe connector.
properties	_NewEnum (see page 244)	Used by Visual Basic to support the implementation of **For Each ... Next**.
	Count (see page 216)	Gets the number of frames in the collection.
	Item (see page 224)	Gets one of the frames in the collection given either an index, computer name, or IP address.
Instrument (see page 98)		The logic analyzer instrument.

Objects	Methods/Properties	Description
methods	Close (see page 145)	Closes the current configuration.
	DeleteFile (see page 147)	Deletes a file on the instrument file system.
	DoAction (see page 147)	Execute a specific XML-based command action.
	DoCommands (see page 147)	Execute a particular XML-based command.
	Export (see page 151)	Exports data to a file on the instrument file system.
	ExportEx (see page 152)	Exports data to a file on the instrument file system.
	GetProbeByName (see page 168)	Given a probe name, returns its corresponding probe object.
	GetModuleByName (see page 165)	Given a module name, returns its corresponding hardware module object.
	GetToolByName (see page 173)	Given a tool name, returns its corresponding tool object.
	GetWindowByName (see page 174)	Given a window name, returns its corresponding window object.
	Import (see page 179)	Imports data from a file located on the instrument file system.
	ImportEx (see page 180)	Imports data from a file located on the instrument file system into a particular module.
	GoOffline (see page 174)	Disconnects the user interface from the logic analyzer frame.
	GoOnline (see page 178)	Connects the user interface to a specific logic analyzer frame.
	IsOnline (see page 181)	Tells whether the user interface is connected to a logic analyzer frame.
	New (see page 182)	Creates a new instrument Overview.
	Open (see page 182)	Loads a previously saved configuration file on the instrument file system.
	PanelLock (see page 183)	Disables user access to the instrument front panel or remote display.
	PanelUnlock (see page 186)	Re-enables user access to the instrument front panel or remote display.
	QueryCommand (see page 186)	Query for XML-based commands.
	Run (see page 192)	Starts running all modules.
	Save (see page 193)	Saves the current configuration to a file on the instrument file system.
	Stop (see page 198)	Stops all currently running modules.
	VBADisplayHelpTopic (see page 200)	Displays the help page and topic for an installed VBA project.
	VBARunMacro (see page 200)	Runs the specified VBA macro as if that macro was selected in the Macros dialog box.
	WaitComplete (see page 200)	Waits until all module, tool, and viewer measurements are complete.

Objects	Methods/Properties	Description
properties	Frames (see page 223)	Gets a collection of logic analyzer frames connected via the multiframe connector.
	Markers (see page 226)	Gets a collection of all the markers in the instrument.
	Model (see page 226)	Gets the model number.
	Modules (see page 227)	Gets a collection of all the hardware modules in the instrument.
	Overview (see page 229)	Gets the XML-format Overview window specification.
	PanelLocked (see page 229)	Indicates the front panel is locked. If locked, the message is returned.
	Probes (see page 231)	Gets a collection of all currently defined probes.
	RemoteComputerName (see page 232)	Gets or sets the remote computer name.
	RemoteUserName (see page 232)	Gets or sets the remote user login name.
	SelfTest (see page 234)	Gets the SelfTest object.
	Status (see page 236)	Gets the status of all hardware modules.
	Tools (see page 240)	Gets a collection of all active software tools.
	VBAVersion (see page 242)	Gets the version number of VBA.
	VBE (see page 242)	Gets the VBE extensibility object.
	Version (see page 243)	Gets the version number of the system software.
	Windows (see page 244)	Gets a collection of all active windows.
Marker (see page 100)		A reference point in the captured data.
properties	Comments (see page 215)	Gets or sets the marker comments.
	Name (see page 227)	Gets or sets the name of the marker.
	TextColor (see page 239)	Gets or sets the marker text color.
	BackgroundColor (see page 209)	Gets or sets the marker background color.
	Position (see page 230)	Gets or sets the marker position.
Markers (see page 100)		A collection of all the defined markers.
methods	Add (see page 143)	Adds a new marker to the collection using specific values.
	AddXML (see page 143)	Adds multiple markers to the collection using an XML string.
	Remove (see page 190)	Removes a marker from the collection.
	RemoveAll (see page 190)	Removes all markers from the collection.
	RemoveXML (see page 190)	Removes multiple markers from the collection using an XML string.
properties	_NewEnum (see page 244)	Used by Visual Basic to support the implementation of **For Each ... Next**.
	Count (see page 216)	Gets the number of markers in the collection.
	Item (see page 224)	Gets one of the markers in the collection given either an index or name.
Module (see page 105)		A generic hardware module.

Objects	Methods/Properties	Description
methods	DoAction (see page 147)	Execute a specific XML-based command action.
	DoCommands (see page 147)	Execute a particular XML-based command.
	QueryCommand (see page 186)	Query for XML-based commands.
	WaitComplete (see page 200)	Waits until the module, tool, and viewer measurements are complete.
properties	BusSignals (see page 212)	Gets a collection of the module's defined bus/signals.
	CardModels (see page 213)	Gets the card model numbers.
	Description (see page 220)	Gets a description of the module.
	Frame (see page 222)	Gets the frame in which the module resides.
	Model (see page 226)	Gets the model number.
	Name (see page 227)	Gets or sets the name of the module.
	RunningStatus (see page 233)	Gets the detailed running status of the module.
	Slot (see page 235)	Gets the module's slot location in the frame.
	Status (see page 236)	Gets the status of the module.
	StatusMsg (see page 237)	Gets the formatted status message.
	Type (see page 241)	Gets the specific module type.
Modules (see page 105)		A collection of all the hardware modules installed in the instrument.
properties	_NewEnum (see page 244)	Used by Visual Basic to support the implementation of **For Each ... Next**.
	Count (see page 216)	Gets the number of modules in the collection.
	Item (see page 224)	Gets one of the modules in a collection given either a slot, index, or name.
PattgenModule (see page 106)		A pattern generator hardware module.
methods	GetLine (see page 162)	Gets an instruction or vector at line number.
	GetLineLabel (see page 164)	Gets a vector's label value at line number.
	InsertLine (see page 181)	Inserts a new instruction or vector after line number.
	RemoveLine (see page 191)	Removes the instruction or vector at line number.
	Reset (see page 191)	Resets the current line number to the first line.
	Resume (see page 192)	Resumes running the pattern generator from the current line number.
	Run (see page 192)	Starts running the pattern generator.
	SetLine (see page 194)	Sets an instruction or vector at line number.
	SetLineLabel (see page 194)	Sets a vector's label value at line number.
	Step (see page 198)	Steps the pattern generator from the current line number.
	Stop (see page 199)	Stops the pattern generator if it is currently running.
properties	NumLines (see page 228)	Gets the number of lines in the main sequence.

Objects	Methods/Properties	Description
Probe (see page 111)		A generic probe.
methods	DoAction (see page 147)	Execute a specific XML-based command action.
	DoCommands (see page 147)	Execute a particular XML-based command.
	QueryCommand (see page 186)	Query for XML-based commands.
properties	Name (see page 227)	Gets or sets the name of the probe.
	Type (see page 241)	Gets the probe's type.
Probes (see page 111)		A collection of all active probes.
properties	_NewEnum (see page 244)	Used by Visual Basic to support the implementation of **For Each ... Next**.
	Count (see page 216)	Gets the number of probes in the collection.
	Item (see page 224)	Gets one of the probes in the collection given either an index or name.
ProtocolWindow (see page 114)		A window which displays protocol data from a serial analyzer.
methods	GetProtocolDataFields (see page 168)	Gets the acquisition data for the fields displayed in the Protocol Viewer.
	WriteProtocolDataFieldsToFile (see page 204)	Writes the acquisition data displayed in various fields in the Protocol Viewer to a specified CSV file.
	GetTriggerSampleNumber (see page 173)	Gets the packet number and channel of the trigger packet.
SampleBusSignalData (see page 114)		The data for a specific bus/signal captured in the state or timing sampling modes.
methods	GetDataBySample (see page 159)	Given a sample range, returns an array of data.
	GetDataByTime (see page 161)	Given a time range, returns an array of data.
	GetNumSamples (see page 168)	Given a range, returns the number of samples stored.
	GetSampleNumByTime (see page 172)	Gets the closest sample number corresponding to the time given.
	GetTime (see page 172)	Given a range, returns the time for this bus/signal in the format specified by the data type given.
properties	DataType (see page 220)	Gets the recommended bus/signal data type.
	EndSample (see page 221)	Gets the data's ending sample number relative to trigger.
	EndTime (see page 221)	Gets the data's ending time relative to trigger.
	StartSample (see page 235)	Gets the data's starting sample number relative to trigger.
	StartTime (see page 236)	Gets the data's starting time relative to trigger.
SampleDifference (see page 125)		Represents a sample containing a CompareWindow difference.
properties	BusSignalDifferences (see page 212)	Gets a collection of all the buses/signals with differences for this sample.
	SampleNum (see page 233)	Gets the sample number at which differences occurred.
SampleDifferences (see page 125)		A collection object of all the sample differences in the CompareWindow object.

Objects	Methods/Properties	Description
properties	_NewEnum (see page 244)	Used by Visual Basic to support the implementation of **For Each ... Next**.
	Count (see page 216)	Gets the number of bus/signal differences in the collection.
	Item (see page 224)	Given an index into the collection, gets a SampleDifference (see page 125) object from the collection.
SelfTest (see page 125)		Object for running instrument self-tests.
methods	TestAll (see page 199)	Runs an instrument's self-tests.
SerialModule (see page 128)		A hardware measurement module for viewing and analyzing serial data.
methods	RecallTriggerByFile (see page 188)	Loads a previously saved trigger file located on the instrument file system.
Tool (see page 128)		A generic instrument software tool.
methods	DoAction (see page 147)	Execute a specific XML-based command action.
	DoCommands (see page 147)	Execute a particular XML-based command.
	QueryCommand (see page 186)	Query for XML-based commands.
properties	BusSignals (see page 212)	Gets a collection of the tool's defined bus/signals.
	Name (see page 227)	Gets or sets the name of the tool.
	Type (see page 241)	Gets the specific tool type.
Tools (see page 129)		A collection of all of the instrument's software tools.
properties	_NewEnum (see page 244)	Used by Visual Basic to support the implementation of **For Each ... Next**.
	Count (see page 216)	Gets the number of tools in the collection.
	Item (see page 224)	Gets one of the tools in the collection given either an index or name.
VbaViewChart (see page 132)		A chart for the VbaViewWindow.
methods	Draw (see page 151)	Draws the chart.
properties	Axis (see page 208)	Gets the chart axis given an axis type.
	ChartType (see page 214)	Gets or sets the chart type.
	Data (see page 219)	Gets the chart data.
	HasLegend (see page 223)	Gets or sets if the legend is visible.
	HasTitle (see page 223)	Gets or sets if the title is visible.
	Legend (see page 225)	Gets the chart legend.
	Title (see page 240)	Gets the title of the chart.
VbaViewChartAxis (see page 133)		The axis of a VbaViewChart.

Objects	Methods/Properties	Description
properties	AxisBase (see page 208)	Gets or sets the chart axis base.
	BitSize (see page 210)	Gets or sets the width of the data in bits. This is used to format the Axis values.
	HasTitle (see page 223)	Gets or sets if the title is visible.
	Title (see page 240)	Gets the title of the axis.
VbaViewChartData (see page 133)		The data of a VbaViewChart.
methods	AddPointArrays (see page 144)	Adds an array of points to the chart. This is only valid for chart types AgtChartTypeLine and AgtChartTypeXYScatter.
	Clear (see page 145)	Clears all of the chart data.
	GetGroupCaption (see page 162)	Gets the caption associated with a group (row).
	GetValueCaption (see page 173)	Gets the caption associated with all values at index (column).
	SetGroupCaption (see page 194)	Sets the caption associated with a group (row).
	SetValue (see page 195)	Sets an individual value in the chart array.
	SetValueArray (see page 195)	Sets an array of values in the chart array starting at index 0.
	SetValueCaption (see page 196)	Sets the caption associated with all values at index (column).
VbaViewChartFont (see page 134)		The font of a VbaViewChartTitle.
properties	Bold (see page 210)	Gets or sets the text thickness.
	Color (see page 215)	Gets or sets the text color.
	FaceName (see page 222)	Gets or sets the text face name string.
	Size (see page 235)	Gets or sets the text size.
VbaViewChartLegend (see page 134)		The legend of a VbaViewChart.
properties	Position (see page 230)	Gets or sets the chart legend position.
VbaViewChartTitle (see page 134)		The title of a VbaViewChart.
properties	Caption (see page 213)	Gets or sets the chart title caption.
	Font (see page 222)	Gets the chart title font.
VbaViewWebBrowser (see page 135)		A web browser for the VbaViewWindow.
methods	Clear (see page 145)	Displays an empty web page.
properties	WebBrowser (see page 243)	Gets the contained IWebBrowser2 interface.
VbaViewWindow (see page 135)		A window for Visual Basic for Applications (VBA) program output.
methods	ClearOutput (see page 145)	Clears the strings from the output window.
	WriteOutput (see page 205)	Writes a string to the output window.
properties	Chart (see page 214)	Gets the Chart view.
	WebBrowser (see page 243)	Gets the Web Browser view.
Window (see page 136)		A generic instrument display window.

Objects	Methods/Properties	Description
methods	DoAction (see page 147)	Execute a specific XML-based command action.
	DoCommands (see page 147)	Execute a particular XML-based command.
	Find (see page 154)	Finds a specified data event with optional occurrence and time duration.
	FindNext (see page 158)	Finds the next event by searching forward from the last event found using the event specified by the last call to Find.
	FindPrev (see page 159)	Finds the previous event by searching backward from the last event found using the event specified by the last call to Find.
	GoToPosition (see page 179)	Moves the center of the window to a new position.
	QueryCommand (see page 186)	Query for XML-based commands.
properties	BusSignals (see page 212)	Gets a collection of the window's defined bus/signals.
	Name (see page 227)	Gets or sets the name of the window.
	Type (see page 241)	Gets the window's type.
Windows (see page 137)		A collection of all of the instrument's display windows.
properties	_NewEnum (see page 244)	Used by Visual Basic to support the implementation of **For Each ... Next**.
	Count (see page 216)	Gets the number of windows in the collection.
	Item (see page 224)	Gets one of the windows in the collection given either an index or name.

See Also

- Logic Analyzer Object Hierarchy Overview (see page 80)

Object Hierarchy Overview

The Instrument object represents the logic analysis system. From the Instrument object, you can directly access objects by using the Instrument objects properties and methods, or, you can indirectly access objects through other objects obtained by these properties and methods.

The Instrument object contains collections of: Modules (see page 105) (that represent the hardware installed in the instrument), Probes (see page 111) (that organize probes connected to a DUT), Tools (see page 129) (that filter or decode captured data), and Windows (see page 137) (that display captured data). When the instrument is initially powered up, the Probes and Tools collections are empty and are not available until they are created in the user interface or restored by opening configuration files.

Module (see page 105), Tool (see page 128), and Window (see page 136) objects return data through a BusSignalData (see page 86) object, which returns information about:

- Directly acquired data when obtained from a Module (see page 105) object.
- Created and/or manipulated data when obtained from a Tool (see page 128) object.
- Displayed data when obtained from a Window (see page 136) object.

The following tree illustrates the hierarchy of the Instrument object:

- Connect (see page 95) — Not used in integrated VBA environment.
  - Instrument (see page 98) — Not used in integrated VBA environment.
    - Frames (see page 98)
      - Frame (see page 97)
    - Markers (see page 100)
      - Marker (see page 100)
    - SelfTest (see page 125)
    - Modules (see page 105) — Collection of all modules in the system.
      - *Module* (see page 105) — Generic module object.
        - BusSignals (see page 90)
          - BusSignal (see page 85)
            - *BusSignalData* (see page 86)
            - Sample*BusSignalData* (see page 114)
      - Analyzer*Module* (see page 84) — Logic analyzer specific object.
      - Pattgen*Module* (see page 106) — Pattern generator specific object.
      - SerialModule (see page 128) — Serial analyzer specific object.
      - Exerciser (see page 96) - A hardware measurement module for sending defined stimulus to a DUT.
    - Probes (see page 111)
      - Probe (see page 111)
    - Tools (see page 129)
      - Tool (see page 128)
        - BusSignals (see page 90)
          - BusSignal (see page 85)
            - *BusSignalData* (see page 86) — Generic bus/signal data object.
            - Sample*BusSignalData* (see page 114) — Sample bus/signal data specific object.

- Windows (see page 137)
  - *Window* (see page 136) — Generic window object.
    - BusSignals (see page 90)
      - BusSignal (see page 85)
        - *BusSignalData* (see page 86)
        - Sample*BusSignalData* (see page 114)
    - FindResult (see page 97)
  - Compare*Window* (see page 95) — Compare window specific object.
    - SampleDifferences (see page 125)
      - SampleDifference (see page 125)
        - BusSignalDifferences (see page 86)
          - BusSignalDifference (see page 86)
  - ProtocolWindow (see page 114) - Protocol Viewer window specific object.
  - VbaView*Window* (see page 135) — VbaView window specific object.
    - VbaViewChart (see page 132)
      - VbaViewChartAxis (see page 133)
      - VbaViewChartData (see page 133)
      - VbaViewChartLegend (see page 134)
      - VbaViewChartTitle (see page 134)
        - VbaViewChartFont (see page 134)
    - VbaViewWebBrowser (see page 135)
- ConnectSystem (see page 95)

Italics = This denotes a generic/specific relationship known as inheritance.

Containment and Inheritance

There are generic and specific objects. For example:

- The Module (see page 105) object is generic; it contains the methods and properties that are common to both the AnalyzerModule (see page 84) object and the PattgenModule (see page 106) object.
- The AnalyzerModule (see page 84) object contains logic analyzer specific properties and methods (such as the GetDataBySample (see page 159) method), but it also has access to all of the generic properties and methods in the Module (see page 105) object.
- The PattgenModule (see page 106) object contains pattern generator specific properties and methods (such as the InsertLine (see page 181) method), but it also has access to all of the generic properties and methods in the Module (see page 105) object.

If you know what type of object you have, use the specific objects (like AnalyzerModule (see page 84) and PattgenModule (see page 106)).

If you don't know what type of object you have, use the generic object (like Module (see page 105)); then, depending on the type, you can use the more specific objects. For example:

```
Dim myModule As AgtLA.Module
Set myModule = AgtLA.Modules(0)    ' Start generic (integrated VBA env).

Dim myAnalyzerModule As AgtLA.AnalyzerModule
If (myModule.Type = "Analyzer") Then    ' Once you know the type,
  Set myAnalyzerModule = myModule       ' use the more specific object
End If                                  ' (coerce).
```

```
Dim myPattgenModule As AgtLA.PattgenModule
If (myModule.Type = "Pattgen") Then    ' Once you know the type,
  Set myPattgenModule = myModule       ' use the more specific object
End If                                 ' (coerce).
```

See Also

- Object Quick Reference (see page 83)

Object Quick Reference

[Automation Home (see page 3)] [Objects]

Object	Description
AnalyzerModule (see page 84)	A state/timing analyzer hardware measurement module.
BusSignal (see page 85)	A named and grouped set of pod channels.
BusSignalData (see page 86)	A generic bus/signal data object.
BusSignalDifference (see page 86)	Represents the different values for a particular bus/signal within a sample that has differences.
BusSignalDifferences (see page 86)	A collection object that contains all of the SampleDifference object's buses/signals with differences.
BusSignals (see page 90)	A collection of the hardware module's defined BusSignals.
CompareWindow (see page 95)	A window that compares bus/signal data.
Connect (see page 95)	A connection to the logic analyzer instrument.
ConnectSystem (see page 95)	A connection to the logic analyzer system.
Exerciser (see page 96)	A hardware measurement module for sending defined stimulus to a DUT.
FindResult (see page 97)	Gets the results from the Find (see page 154), FindNext (see page 158), and FindPrev (see page 159) method calls.
Frame (see page 97)	A logic analyzer frame.
Frames (see page 98)	A collection of logic analyzer frames connected via the multiframe connector.
Instrument (see page 98)	The logic analyzer instrument.
Marker (see page 100)	A reference point in the captured data.
Markers (see page 100)	A collection of all the defined markers.
Module (see page 105)	A generic hardware module.
Modules (see page 105)	A collection of all the hardware modules installed in the instrument.
PattgenModule (see page 106)	A pattern generator hardware module.
Probe (see page 111)	A generic probe.
Probes (see page 111)	A collection of all active probes.
ProtocolWindow (see page 114)	A window which displays protocol data from a serial analyzer.
SampleBusSignalData (see page 114)	The data for a specific bus/signal captured in the state or timing sampling modes.
SampleDifference (see page 125)	Represents a sample containing a CompareWindow difference.
SampleDifferences (see page 125)	A collection object of all the sample differences in the CompareWindow object.
SelfTest (see page 125)	Provides methods for running instrument self-tests.
SerialModule (see page 128)	A hardware measurement module for viewing and analyzing serial data.
Tool (see page 128)	A generic instrument software tool.
Tools (see page 129)	A collection of all of the instrument's software tools.

Object	Description
VbaViewChart (see page 132)	A chart for the VbaViewWindow.
VbaViewChartAxis (see page 133)	The axis of a VbaViewChart.
VbaViewChartData (see page 133)	The data of a VbaViewChart.
VbaViewChartFont (see page 134)	The font properties of a VbaViewChartTitle.
VbaViewChartLegend (see page 134)	The legend of a VbaViewChart.
VbaViewChartTitle (see page 134)	The title of a VbaViewChart.
VbaViewWebBrowser (see page 135)	A web browser for the VbaViewWindow.
VbaViewWindow (see page 135)	A window for Visual Basic for Applications (VBA) program output.
Window (see page 136)	A generic instrument display window.
Windows (see page 137)	A collection of all of the instrument's display windows.

See Also

- Logic Analyzer Object Hierarchy Overview (see page 80)

AnalyzerModule Object

[Automation Home (see page 3)] [Objects (see page 83)]

To Access

```
Dim variable As AgtLA.AnalyzerModule
Set variable = Module (see page 105)
```

Description

The AnalyzerModule object represents a state/timing analyzer hardware measurement module.

Since this object is derived from the Module (see page 105) object, a Set must be used to get to these specific methods and properties. For example:

```
' When using Visual Basic outside of the Keysight Logic Analyzer
' application, you must create the Connect object (see
page 95) and use it
' to access the Instrument object.  In this example, "myInst"
' represents the Instrument object.
'
' When "using the Advanced Customization Environment (ACE)" (in the
online help),
' the Instrument object is already created and is globally
' accessible using "AgtLA".  In this example, substitute "myInst"
' with "AgtLA" to access the global Instrument object in VBA.

' Get the AnalyzerModule specific object.
Dim myAnalyzer As AgtLA.AnalyzerModule
Set myAnalyzer = myInst.Modules(0)
MsgBox "Trigger: " + myAnalyzer.Trigger
```

Methods

Method	Description
GetRawData (see page 169)	Given a range, returns the raw analyzer data.
GetRawTimingZoomData (see page 170)	Given a range, returns the raw analyzer timing zoom data.
RecallTriggerByName (see page 189)	Loads a named trigger from the recall buffer.
RecallTriggerByFile (see page 188)	Loads a previously saved trigger file on the instrument file system.
SimpleTrigger (see page 196)	Trigger on a simple condition with optional occurrence and storage qualification.
WaitComplete (see page 200)	Waits until the analyzer module, tool, and viewer measurements are complete.

(Also Includes Module (see page 105) object methods)

Properties

Property	Description
Setup (see page 234)	Gets or sets the logic analyzer's XML-format setup specification.
Trigger (see page 240)	Gets or sets the logic analyzer's XML-format trigger specification.

(Also Includes Module (see page 105) object properties)

BusSignal Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 91)]

To Access

- BusSignals.Item (see page 224) IndexOrName
- BusSignals IndexOrName

Methods

Method	Description
IsTimingZoom (see page 181)	Is this a timing zoom bus/signal?

Properties

Property	Description
Activity (see page 207)	Gets the activity indicators of the bus/signal.
BitSize (see page 210)	Gets the number of channels in the bus/signal.
BusSignalData (see page 211)	Gets the acquisition data associated with a bus/signal.
BusSignalType (see page 211)	Gets the type of bus/signal.
ByteSize (see page 212)	Gets the size of the bus/signal in bytes.
Channels (see page 213)	Gets the channels defined in the bus/signal.
CreatorName (see page 219)	Gets the name of the module, tool, or viewer that created this bus/signal.
Name (see page 227)	Gets or sets the name of the bus/signal.
Polarity (see page 230)	Gets the polarity of the bus/signal.
Symbols (see page 238)	Gets or sets the symbols associated with a bus/signal.

See Also

- BusSignals (see page 90) object

BusSignalData Object

[Automation Home (see page 3)] [Objects (see page 83)]

To Access

- BusSignal.BusSignalData (see page 211)

Methods

There are no methods.

Properties

Property	Description
Type (see page 241)	Gets the specific bus/signal data type.

See Also

- BusSignalData (see page 211) property

BusSignalDifference Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 87)]

To Access

- BusSignalDifferences.Item (see page 224) IndexOrName
- BusSignalDifferences IndexOrName

Methods

There are no methods.

Properties

Property	Description
Name (see page 227)	Gets the bus/signal name associated with the sample difference.
Reference (see page 231)	Gets the reference buffer value associated with the sample difference.
Value (see page 242)	Gets the data value associated with the sample difference.

See Also

- BusSignalDifferences (see page 86) object

BusSignalDifferences Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 87)]

To Access

- SampleDifference.BusSignalDifferences (see page 212)

Methods

There are no methods.

Properties

Property	Description
_NewEnum (see page 244)	Used by Visual Basic to support the implementation of **For Each ... Next**.
Count (see page 216)	Gets the number of bus/signal differences in the collection.
Item (see page 224)	Given an index into the collection, gets a BusSignalDifference (see page 86) object from the collection.

See Also

- BusSignalDifferences (see page 212) property

BusSignalDifferences Example

Visual Basic

```
' When using Visual Basic outside of the Keysight Logic Analyzer
' application, you must create the Connect object (see
page 95) and use it
' to access the Instrument object.  In this example, "myInst"
' represents the Instrument object.
'
' When "using the Advanced Customization Environment (ACE)" (in the
online help),
' the Instrument object is already created and is globally
' accessible using "AgtLA".  In this example, substitute "myInst"
' with "AgtLA" to access the global Instrument object in VBA.

' Load the configuration file.
myInst.Open ("c:\LA\Configs\mpc860_demo_compare.ala")

' Run the measurement, wait for it to complete.
myInst.Run
myInst.WaitComplete (20)

' Get the CompareWindow object.
Dim myCompare As AgtLA.CompareWindow
Set myCompare = myInst.GetWindowByName("Compare-1")

' Set the CompareWindow options.
Dim myOptions As String
myOptions = "<Options ReferenceOffset='0' Range='M1..M2' " + _
      "MaxDifferences='0'/>"
myCompare.Options = myOptions

' Display the CompareWindow options.
myOptions = myCompare.Options
MsgBox "CompareWindow Options: " + myOptions

' Execute the compare.
myCompare.Execute

' Display the bus/signal differences between M1 and M2.
Dim mySampleDiff As AgtLA.SampleDifference
Dim myBusSignalDiff As AgtLA.BusSignalDifference
Dim myString As String

For Each mySampleDiff In myCompare.SampleDifferences
   myString = myString + vbNewLine + "Sample: " + _
         Str(mySampleDiff.SampleNum)
   For Each myBusSignalDiff In mySampleDiff.BusSignalDifferences
      ' Add the bus signal difference information to the string.
      myString = myString + ", Bus/signal: " + myBusSignalDiff.Name
      myString = myString + ", Value: " + myBusSignalDiff.Value
      myString = myString + ", Ref: " + myBusSignalDiff.Reference
   Next
Next
MsgBox "BusSignal difference values: " + vbNewLine + myString
```

Visual C++

```
//
//  This simple Visual C++ Console application demonstrates how to use
```

```
//  the Keysight 168x/169x/169xx COM interface to display bus/signal
//  differences in the Compare window.
//
//  This project was created in Visual C++ Developer.  To create a
//  similar project:
//
//    - Execute File -> New
//    - Select the Projects tab
//    - Select "Win32 Console Application"
//    - Select A "hello,World!" application (Visual Studio 6.0)
//
//  To make this buildable, you need to specify your "import" path
//  in stdafx.h (search for "TODO" in that file).  For example, add:
//  #import "C:/Program Files/Keysight Technologies/Logic Analyzer/LA \
//  COM Automation/agClientSvr.dll"
//
//  To run, you need to specify the host logic analyzer to connect
//  to (search for "TODO" below).
//

#include "stdafx.h"


////////////////////////////////////////////////////////////////////
//
//  Forward declarations.
//
void DisplayError(_com_error& err);


////////////////////////////////////////////////////////////////////
//
//  main() entry point.
//
int main(int argc, char* argv[])
{
   printf("*** Main()\n");

   //
   //  Initialize the Microsoft COM/ActiveX library.
   //
   HRESULT hr = CoInitialize(0);

   if (SUCCEEDED(hr))
   {
      try {   // Catch any unexpected run-time errors.
         _bstr_t hostname = "mtx33";   // TODO, use your logic
                                       // analysis system hostname.
         printf("Connecting to instrument '%s'\n", (char*) hostname);

         // Create the connect object and get the instrument object.
         AgtLA::IConnectPtr pConnect =
               AgtLA::IConnectPtr(__uuidof(AgtLA::Connect));
         AgtLA::IInstrumentPtr pInst =
               pConnect->GetInstrument(hostname);

         // Load the configuration file.
```

```
      _bstr_t configFile = "C:\\LA\\Configs\\compare.ala";
      printf("Loading the config file '%s'\n", (char*) configFile);
      pInst->Open(configFile, FALSE, "", TRUE);

      // Run the measurement, wait for it to complete.
      pInst->Run(FALSE);
      pInst->WaitComplete(20);

      // Get the CompareWindow object.
      AgtLA::ICompareWindowPtr pCompareWindow =
            pInst->GetWindowByName("Compare-1");

      // Set the CompareWindow options.
      _bstr_t myCompareOptions = "<Options ReferenceOffset='0' \
            Range='M1..M2' MaxDifferences='0'/>";
      pCompareWindow->PutOptions(myCompareOptions);

      // Display the CompareWindow options.
      myCompareOptions = pCompareWindow->GetOptions();
      printf("CompareWindow options: '%s'\n",
            (char*) myCompareOptions);

      // Execute the compare.
      pCompareWindow->Execute();

      // Display the bus/signal differences between M1 and M2.
      AgtLA::ISampleDifferencesPtr pSampleDifferences =
            pCompareWindow->GetSampleDifferences();
      for (long i = 0; i < pSampleDifferences->GetCount(); i++)
      {
         AgtLA::ISampleDifferencePtr pSampleDifference =
               pSampleDifferences->GetItem(i);
         printf("Sample: '%d'\n", pSampleDifference->GetSampleNum());

         AgtLA::IBusSignalDifferencesPtr pBusSignalDifferences =
               pSampleDifference->GetBusSignalDifferences();
         for (long j = 0; j < pBusSignalDifferences->GetCount(); j++)
         {
            // Print the bus signal difference information.
            AgtLA::IBusSignalDifferencePtr pBusSignalDifference =
                  pBusSignalDifferences->GetItem(j);
            printf("  Bus/signal: '%s'\n",
                  (char*) pBusSignalDifference->GetName());
            printf("  Value: '%s'\n",
                  (char*) pBusSignalDifference->GetValue());
            printf("  Ref: '%s'\n",
                  (char*) pBusSignalDifference->GetReference());
         }
      }
   }
   catch (_com_error& e) {
      DisplayError(e);
   }

   // Uninitialize the Microsoft COM/ActiveX library.
   CoUninitialize();
}
```

```
   else
   {
      printf("CoInitialize failed\n");
   }

   return 0;
}


////////////////////////////////////////////////////////////////////
//
//  Displays the last error -- used to show the last exception
//  information.
//
void DisplayError(_com_error& error)
{
   printf("*** DisplayError()\n");

   printf("Fatal Unexpected Error:\n");
   printf("  Error Number = %08lx\n", error.Error());

   static char errorStr[1024];
   _bstr_t desc = error.Description();

   if (desc.length() == 0)
   {
      // Don't have a description string.
      strcpy(errorStr, error.ErrorMessage());
      int nLen = lstrlen(errorStr);

      // Remove funny carriage return ctrl<M>.
      if (nLen > 2 && (errorStr[nLen - 2] == 0xd))
      {
         errorStr[nLen - 2] = '\0';
      }
   }
   else
   {
      strcpy(errorStr, desc);
   }

   printf("  Error Message = %s\n", (char*) errorStr);
}
```

BusSignals Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 91)]

To Access

- Module.BusSignals (see page 212)
- Tool.BusSignals (see page 212)
- Window.BusSignals (see page 212)

Methods

Method	Description
Add (see page 142)	Adds a new bus/signal to the collection.
Remove (see page 190)	Removes a bus/signal from the collection.

Properties

Property	Description
_NewEnum (see page 244)	Used by Visual Basic to support the implementation of **For Each ... Next**.
Count (see page 216)	Gets the number of BusSignal (see page 85) objects in the collection.
Item (see page 224)	Gets one of the BusSignal (see page 85) objects in the collection given either an index or name.

Remarks

NOTE The "Time" data is no longer returned as a bus/signal (see What's Changed (see page 249)).

See Also

- BusSignals (see page 212) property

BusSignals Example

Visual Basic

```
' When using Visual Basic outside of the Keysight Logic Analyzer
' application, you must create the Connect object (see
page 95) and use it
' to access the Instrument object.  In this example, "myInst"
' represents the Instrument object.
'
' When "using the Advanced Customization Environment (ACE)" (in the
online help),
' the Instrument object is already created and is globally
' accessible using "AgtLA".  In this example, substitute "myInst"
' with "AgtLA" to access the global Instrument object in VBA.

' Display bus/signal information.
Dim myBusSignals As AgtLA.BusSignals
Set myBusSignals = myInst.GetModuleByName("My 1690A-1").BusSignals

Dim myBusSignal As AgtLA.BusSignal
Dim myString As String

For Each myBusSignal In myBusSignals
   myString = myString + "Name: " + myBusSignal.Name + vbNewLine
   myString = myString + "  BitSize=" + Str(myBusSignal.BitSize)
   myString = myString + ", ByteSize=" + Str(myBusSignal.ByteSize)
   myString = myString + ", Type="
   Select Case myBusSignal.BusSignalType
      Case AgtBusSignalSampleNum
         myString = myString + "AgtBusSignalSampleNum" + vbNewLine
      Case AgtBusSignalTime
         myString = myString + "AgtBusSignalTime" + vbNewLine
      Case AgtBusSignalGenerated
         myString = myString + "AgtBusSignalGenerated" + vbNewLine
```

```
      Case AgtBusSignalProbed
         myString = myString + "AgtBusSignalProbed" + vbNewLine
         myString = myString + "  Channels=" + _
               myBusSignal.Channels + vbNewLine
         myString = myString + "  Polarity=" + _
               myBusSignal.Polarity + vbNewLine
         myString = myString + "  Activity=" + _
               myBusSignal.Activity + vbNewLine
      Case Else
         myString = myString + "Unknown" + vbNewLine
   End Select
Next

MsgBox "Bus/signal information: " + myString
```

Visual C++

```
//
//  This simple Visual C++ Console application demonstrates how to use
//  the Keysight 168x/169x/169xx COM interface to display bus/signal
//  information.
//
//  This project was created in Visual C++ Developer.  To create a
//  similar project:
//
//    - Execute File -> New
//    - Select the Projects tab
//    - Select "Win32 Console Application"
//    - Select A "hello,World!" application (Visual Studio 6.0)
//
//  To make this buildable, you need to specify your "import" path
//  in stdafx.h (search for "TODO" in that file).  For example, add:
//  #import "C:/Program Files/Keysight Technologies/Logic Analyzer/LA \
//  COM Automation/agClientSvr.dll"
//
//  To run, you need to specify the host logic analyzer to connect
//  to (search for "TODO" below).
//

#include "stdafx.h"


////////////////////////////////////////////////////////////////////////
//
//  Forward declarations.
//
void DisplayError(_com_error& err);


////////////////////////////////////////////////////////////////////////
//
//  main() entry point.
//
int main(int argc, char* argv[])
{
   printf("*** Main()\n");

   //
   //  Initialize the Microsoft COM/ActiveX library.
```

```
//
HRESULT hr = CoInitialize(0);

if (SUCCEEDED(hr))
{
   try {   // Catch any unexpected run-time errors.
      _bstr_t hostname = "mtx33";   // TODO, use your logic
                                    // analysis system hostname.
      printf("Connecting to instrument '%s'\n", (char*) hostname);

      // Create the connect object and get the instrument object.
      AgtLA::IConnectPtr pConnect =
            AgtLA::IConnectPtr(__uuidof(AgtLA::Connect));
      AgtLA::IInstrumentPtr pInst =
            pConnect->GetInstrument(hostname);

      // Load the configuration file.
      _bstr_t configFile = "C:\\LA\\Configs\\config.ala";
      printf("Loading the config file '%s'\n", (char*) configFile);
      pInst->Open(configFile, FALSE, "", TRUE);

      // Get module whose bus/signal information will be displayed.
      _bstr_t moduleName = "MPC860 Demo Board";
      AgtLA::IModulePtr pModule = pInst->GetModuleByName(moduleName);

      // For each bus/signal, display a range of data.
      AgtLA::IBusSignalsPtr pBusSignals = pModule->GetBusSignals();
      for (long i = 0; i < pBusSignals->GetCount(); i++)
      {
         // Get the data for the bus/signal.
         AgtLA::IBusSignalPtr pBusSignal =
               pModule->GetBusSignals()->GetItem(i);
         _bstr_t busSignal = pBusSignal->GetName();
         printf("Name: '%s'\n", (char*) busSignal);
         printf("  BitSize: '%d'\n", pBusSignal->GetBitSize());
         printf("  ByteSize: '%d'\n", pBusSignal->GetByteSize());

         switch(pBusSignal->GetBusSignalType())
         {
         case AgtLA::AgtBusSignalProbed:
            {
               printf("  Type: 'AgtBusSignalProbed'\n");
            }
            break;

         case AgtLA::AgtBusSignalGenerated:
            {
               printf("  Type: 'AgtBusSignalGenerated'\n");
            }
            break;

         case AgtLA::AgtBusSignalSampleNum:
            {
               printf("  Type: 'AgtBusSignalSampleNum'\n");
            }
            break;
```

```
            case AgtLA::AgtBusSignalTime:
               {
                  printf("  Type: 'AgtBusSignalTime'\n");
               }

            default:
               break;

            }
         }
      }
      catch (_com_error& e) {
         DisplayError(e);
      }

      // Uninitialize the Microsoft COM/ActiveX library.
      CoUninitialize();
   }
   else
   {
      printf("CoInitialize failed\n");
   }

   return 0;
}


//////////////////////////////////////////////////////////////////////
//
//  Displays the last error -- used to show the last exception
//  information.
//
void DisplayError(_com_error& error)
{
   printf("*** DisplayError()\n");

   printf("Fatal Unexpected Error:\n");
   printf("  Error Number = %08lx\n", error.Error());

   static char errorStr[1024];
   _bstr_t desc = error.Description();

   if (desc.length() == 0)
   {
      // Don't have a description string.
      strcpy(errorStr, error.ErrorMessage());
      int nLen = lstrlen(errorStr);

      // Remove funny carriage return ctrl<M>.
      if (nLen > 2 && (errorStr[nLen - 2] == 0xd))
      {
         errorStr[nLen - 2] = '\0';
      }
   }
   else
   {
      strcpy(errorStr, desc);
```

```
    }

    printf("  Error Message = %s\n", (char*) errorStr);
}
```

CompareWindow Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 87)]

To Access

```
Dim variable As AgtLA.CompareWindow
Set variable = Window (see page 136)
```

Description The CompareWindow object represents an instrument window that compares bus/signal data.

Methods

Method	Description
Execute (see page 151)	Executes the compare using the current options.

(Also Includes Window (see page 136) methods)

Properties

Property	Description
Options (see page 229)	Gets or sets the Compare window options.
SampleDifferences (see page 233)	Gets a collection of all the samples with differences found in the last comparison.

(Also Includes Window (see page 136) properties)

Connect Object

[Automation Home (see page 3)] [Objects (see page 83)]

To Access

```
Dim variable As AgtLA.Connect
Set variable = CreateObject("AgtLA.Connect")
```

Methods

Method	Description
CopyFile (see page 146)	Copies a file to the instrument file system.
GetRemoteInfo (see page 171)	Gets the logic analyzer's remote user login and computer name.

Properties

Property	Description
Instrument (see page 224)	Gets the logic analyzer instrument object.

ConnectSystem Object

[Automation Home (see page 3)] [Objects (see page 83)]

To Access

```
Dim variable As AgtLA.ConnectSystem
Set variable = CreateObject("AgtLA.ConnectSystem")
```

Methods

Method	Description
Connect (see page 146)	Connects to the remote logic analyzer system.
RecvFile (see page 189)	Copies a file from the remote logic analyzer system to your local system.
SendFile (see page 193)	Copies a file from your local system to the remote logic analyzer system.

Properties

There are no properties.

Exerciser Object

[Automation Home (see page 3)] [Objects (see page 83)]

To Access

```
Dim variable As AgtLA.Exerciser
Set variable = Module (see page 105)
```

Description

The Exerciser object represents a hardware measurement module for sending defined stimulus to a DUT.

Since this object is derived from the Module (see page 105) object, a Set must be used to get to these specific methods and properties. For example:

```
' When using Visual Basic outside of the Keysight Logic Analyzer
' application, you must create the Connect object (see
page 95) and use it
' to access the Instrument object.  In this example, "myInst"
' represents the Instrument object.
'
' When "using the Advanced Customization Environment (ACE)" (in the
online help),
' the Instrument object is already created and is globally
' accessible using "AgtLA".  In this example, substitute "myInst"
' with "AgtLA" to access the global Instrument object in VBA.

' Get the Exerciser specific object.
Dim myExerciser As AgtLA.Exerciser
Set myExerciser = myInst.Modules(0)
```

Methods

The Exerciser object provides generic methods that accept command string parameters.

The object is currently used for sending D-PHY stimulus from the U4421A D-PHY Analyzer and Exerciser module to a D-PHY DUT.

For a detailed description of each of these methods and the XML format command string parameters that these methods accept, refer to the *Using COM Commands for U4421A Module* section in the *U4421A D-PHY Analyzer and Exerciser online help*.

Method	Description
ApplyToHardware(string cmd)	Applies the stimulus related settings loaded in the Setup dialog box to the stimulus hardware module.
ExecuteCommand(string cmd, out string result)	Loads the specified stimulus settings to the Setup dialog box of the hardware module in the Logic and Protocol Analyzer GUI. In addition, the command also immediately applies these settings to the hardware module even when the module is in the Running state. The command is useful for changing stimulus settings of the module at runtime and for inserting packets dynamically.
GetXmlFormat(string cmdKey, out string currentSettings)	Returns the XML command format for the given command name.
LoadExerciserParameters(string cmd, out string result)	Loads the stimulus related settings for the hardware module to the Setup dialog box of the module in the Logic and Protocol Analyzer GUI.
StartExerciser	Starts the transmission of stimulus from the hardware module to a DUT.
StopExerciser	Stops the transmission of stimulus from the hardware module to a DUT.

(Also Includes Module (see page 105) object methods)

FindResult Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 155)]

To Access

- Window.Find(Event) (see page 154)
- Window.FindNext() (see page 158)
- Window.FindPrev() (see page 159)

Methods

There are no methods.

Properties

Property	Description
Found (see page 222)	Gets the found status.
OccurrencesFound (see page 228)	Gets the number of occurrences found.
SubrowFound (see page 237)	Gets the subrow number if found on a subrow.
TimeFound (see page 239)	Gets the time found as a double.
TimeFoundString (see page 239)	Gets the time found as a string.

See Also

- Find (see page 154) method
- FindNext (see page 158) method
- FindPrev (see page 159) method
- GetDataByTime (see page 161) method

Frame Object

[Automation Home (see page 3)] [Objects (see page 83)]

To Access

- Frames.Item (see page 224) IndexOrName
- Frames IndexOrName

Methods There are no methods.

Properties

Property	Description
ComputerName (see page 216)	Gets the computer name of the logic analyzer frame.
Description (see page 220)	Gets a description of the logic analyzer frame.
IPAddress (see page 224)	Gets the frame's IP address(es).
TargetControlPort (see page 238)	Gets or sets the target control port value.

See Also

- Frames (see page 98) object

Frames Object

[Automation Home (see page 3)] [Objects (see page 83)]

To Access

- Instrument.Frames (see page 223)

Methods There are no methods.

Properties

Property	Description
_NewEnum (see page 244)	Used by Visual Basic to support the implementation of For Each ... Next.
Count (see page 216)	Gets the number of frames in the collection.
Item (see page 224)	Gets one of the frames in the collection given either an index, computer name, or IP address.

See Also

- Frames (see page 223) property

Instrument Object

[Automation Home (see page 3)] [Objects (see page 83)]

To Access

- When using Visual Basic outside of the *Keysight Logic Analyzer* application:

```
Dim variable As AgtLA.Instrument
Set variable = Connect.Instrument (see page 224) HostNameOrIpAddress
```

- When "using the Advanced Customization Environment (ACE)" (in the online help):

  AgtLA

Methods

Method	Description
Close (see page 145)	Closes the current configuration.
DeleteFile (see page 147)	Deletes a file on the instrument file system.
DoAction (see page 147)	Execute a specific XML-based command action.
DoCommands (see page 147)	Execute a particular XML-based command.
Export (see page 151)	Exports data to a file on the instrument file system.

Method	Description
ExportEx (see page 152)	Exports data to a file on the instrument file system.
GetProbeByName (see page 168)	Given a probe name, returns its corresponding probe object.
GetModuleByName (see page 165)	Given a module name, returns its corresponding hardware module object.
GetToolByName (see page 173)	Given a tool name, returns its corresponding tool object.
GetWindowByName (see page 174)	Given a window name, returns its corresponding window object.
Import (see page 179)	Imports data from a file located on the instrument file system.
ImportEx (see page 180)	Imports data from a file located on the instrument file system into a particular module.
GoOffline (see page 174)	Disconnects the user interface from the logic analyzer frame.
GoOnline (see page 178)	Connects the user interface to a specific logic analyzer frame.
IsOnline (see page 181)	Tells whether the user interface is connected to a logic analyzer frame.
New (see page 182)	Creates a new instrument Overview.
Open (see page 182)	Loads a previously saved configuration file on the instrument file system.
PanelLock (see page 183)	Disables user access to the instrument front panel or remote display.
PanelUnlock (see page 186)	Re-enables user access to the instrument front panel or remote display.
QueryCommand (see page 186)	Query for XML-based commands.
Run (see page 192)	Starts running all modules.
Save (see page 193)	Saves the current configuration to a file on the instrument file system.
Stop (see page 198)	Stops all currently running modules.
VBADisplayHelpTopic (see page 200)	Displays the help page and topic for an installed VBA project.
VBARunMacro (see page 200)	Runs the specified VBA macro as if that macro was selected in the Macros dialog box.
WaitComplete (see page 200)	Waits until all module, tool, and viewer measurements are complete.

Properties

Property	Description
Frames (see page 223)	Gets a collection of logic analyzer frames connected via the multiframe connector.
Markers (see page 226)	Gets a collection of all the markers in the instrument.
Model (see page 226)	Gets the model number.
Modules (see page 227)	Gets a collection of all the hardware modules in the instrument.
Overview (see page 229)	Gets the XML-format Overview window specification.
PanelLocked (see page 229)	Indicates the front panel is locked. If locked, the message is returned.
Probes (see page 231)	Gets a collection of all currently defined probes.
RemoteComputerName (see page 232)	Gets or sets the remote computer name.
RemoteUserName (see page 232)	Gets or sets the remote user login name.
SelfTest (see page 234)	Gets the SelfTest object.
Status (see page 236)	Gets the status of all hardware modules.

Property	Description
Tools (see page 240)	Gets a collection of all active software tools.
VBAVersion (see page 242)	Gets the version number of VBA.
VBE (see page 242)	Gets the VBE extensibility object.
Version (see page 243)	Gets the version number of the system software.
Windows (see page 244)	Gets a collection of all active windows.

See Also

- Instrument (see page 224) property

Marker Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 101)]

To Access

- Markers.Item (see page 224) IndexOrName
- Markers IndexOrName

Methods

There are no methods.

Properties

Property	Description
Comments (see page 215)	Gets or sets the marker comments.
Name (see page 227)	Gets or sets the name of the marker.
TextColor (see page 239)	Gets or sets the marker text color.
BackgroundColor (see page 209)	Gets or sets the marker background color.
Position (see page 230)	Gets or sets the marker position.

See Also

- Markers (see page 100) object

Markers Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 101)]

To Access

- Instrument.Markers (see page 226)

Methods

Method	Description
Add (see page 143)	Adds a new marker to the collection using specific values.
AddXML (see page 143)	Adds multiple markers to the collection using an XML string.
Remove (see page 190)	Removes a marker from the collection.
RemoveAll (see page 190)	Removes all markers from the collection.
RemoveXML (see page 190)	Removes multiple markers from the collection using an XML string.

Properties

Property	Description
_NewEnum (see page 244)	Used by Visual Basic to support the implementation of **For Each ... Next**.
Count (see page 216)	Gets the number of markers in the collection.
Item (see page 224)	Gets one of the markers in the collection given either an index or name.

Remarks

Window specific markers such as "Beginning of Data", "End of Data", and "Trigger" and markers with position other than by time are not part of the collection.

See Also

- Markers (see page 226) property

Markers Example

Visual Basic

```
' When using Visual Basic outside of the Keysight Logic Analyzer
' application, you must create the Connect object (see
page 95) and use it
' to access the Instrument object.  In this example, "myInst"
' represents the Instrument object.
'
' When "using the Advanced Customization Environment (ACE)" (in the
online help),
' the Instrument object is already created and is globally
' accessible using "AgtLA".  In this example, substitute "myInst"
' with "AgtLA" to access the global Instrument object in VBA.

' Add a marker and set its position.
myInst.Markers.Add "Loc4", , , 0.00000001

' Change a marker's position and color.
Dim myMarker As AgtLA.Marker
Set myMarker = myInst.Markers("Loc4")
myMarker.Position = 0.000000005
myMarker.BackgroundColor = &HFF00
myMarker.TextColor = &HFF

' Add multiple markers to the collection using an XML string.
myInst.Markers.AddXML "<Markers>" + _
  "<Marker Name='XML M1' Comments='My Marker' " + _
      "ForegroundColor='hff00ff' BackgroundColor='h00ffff' " + _
      "Position='10 ns' LockPosition='T' />" + _
  "<Marker Name='XML M2' ForegroundColor='hff00ff' " + _
      "BackgroundColor='h00ffff' Position='15 ns' " + _
      "LockPosition='F' />" + _
  "<Marker Name='XML M3' BackgroundColor='h00ffff' " + _
      "Position='20 ns' LockPosition='T' />" + _
  "<Marker Name='XML M4' Position='25 ns' LockPosition='F' />" + _
  "<Marker Name='XML M5' LockPosition='T' />" + _
  "<Marker Name='XML M6' />" + _
"</Markers>"

' Display all of the markers.
Dim myMarkerNames As String
For Each myMarker In myInst.Markers
   ' Add the marker name to the string.
   myMarkerNames = myMarkerNames + vbNewLine + myMarker.Name
```

```
Next
MsgBox "Marker names: " + myMarkerNames

' Remove a marker from the collection.
myInst.Markers.Remove "Loc4"

' Remove multiple markers from the collection using an XML string.
myInst.Markers.RemoveXML "<Markers>" + _
  "<Marker Name='XML M1' />" + _
  "<Marker Name='XML M3' />" + _
  "<Marker Name='XML M5' />" + _
"</Markers>"

' Remove all markers from the collection.
myInst.Markers.RemoveAll
```

Visual C++

```
//
//  This simple Visual C++ Console application demonstrates how to use
//  the Keysight 168x/169x/169xx COM interface to set up markers.
//
//  This project was created in Visual C++ Developer.  To create a
//  similar project:
//
//    - Execute File -> New
//    - Select the Projects tab
//    - Select "Win32 Console Application"
//    - Select A "hello,World!" application (Visual Studio 6.0)
//
//  To make this buildable, you need to specify your "import" path
//  in stdafx.h (search for "TODO" in that file).  For example, add:
//  #import "C:/Program Files/Keysight Technologies/Logic Analyzer/LA \
//  COM Automation/agClientSvr.dll"
//
//  To run, you need to specify the host logic analyzer to connect
//  to (search for "TODO" below).
//

#include "stdafx.h"


////////////////////////////////////////////////////////////////////////
//
//  Forward declarations.
//
void DisplayError(_com_error& err);


////////////////////////////////////////////////////////////////////////
//
//  main() entry point.
//
int main(int argc, char* argv[])
{
   printf("*** Main()\n");

   //
   //  Initialize the Microsoft COM/ActiveX library.
```

```
//
HRESULT hr = CoInitialize(0);

if (SUCCEEDED(hr))
{
   try {   // Catch any unexpected run-time errors.
      _bstr_t hostname = "mtx33";   // TODO, use your logic
                                    // analysis system hostname.
      printf("Connecting to instrument '%s'\n", (char*) hostname);

      // Create the connect object and get the instrument object.
      AgtLA::IConnectPtr pConnect =
            AgtLA::IConnectPtr(__uuidof(AgtLA::Connect));
      AgtLA::IInstrumentPtr pInst =
            pConnect->GetInstrument(hostname);

      // Run the measurement, wait for it to complete.
      pInst->Run(FALSE);
      pInst->WaitComplete(20);

      // Get the markers object.
      AgtLA::IMarkersPtr pMarkers = pInst->GetMarkers();

      // Add a marker and set its position.
      pMarkers->Add("Loc4", 0x000000, 0xffff00, 0.00000001);

      // Change a marker's position and color.
      AgtLA::IMarkerPtr pMarker = pMarkers->GetItem("Loc4");
      pMarker->PutPosition(0.000000005);
      pMarker->PutBackgroundColor(0xFF00);
      pMarker->PutTextColor(0xFF);

      // Add multiple markers to the collection using an XML string.
      _bstr_t myAddMarkers = "<Markers> \
            <Marker Name='XML M1' Comments='My Marker' \
               ForegroundColor='hff00ff' BackgroundColor='h00ffff' \
               Position='10 ns' LockPosition='T' /> \
            <Marker Name='XML M2' ForegroundColor='hff00ff' \
               BackgroundColor='h00ffff' Position='15 ns' \
               LockPosition='F' /> \
            <Marker Name='XML M3' BackgroundColor='h00ffff' \
               Position='20 ns' LockPosition='T' /> \
            <Marker Name='XML M4' Position='25 ns' \
               LockPosition='F' /> \
            <Marker Name='XML M5' LockPosition='T' /> \
            <Marker Name='XML M6' /> \
            </Markers>";
      pMarkers->AddXML(myAddMarkers);

      // Display all of the markers.
      for (long i = 0; i < pMarkers->GetCount(); i++)
      {
         pMarker = pMarkers->GetItem(i);
         _bstr_t name = pMarker->GetName();
         printf("Marker name = %s\n", (char*) name);
      }
```

```
            // Remove a marker from the collection.
            pMarkers->Remove("Loc4");
            // Remove multiple markers from the collection using an XML
            // string.
            _bstr_t myRemoveMarkers = "<Markers> \
                  <Marker Name='XML M1' /> \
                  <Marker Name='XML M3' /> \
                  <Marker Name='XML M5' /> \
                  </Markers>";
            pMarkers->RemoveXML(myRemoveMarkers);

            // Remove all markers from the collection.
            pMarkers->RemoveAll();
         }
         catch (_com_error& e) {
            DisplayError(e);
         }

         // Uninitialize the Microsoft COM/ActiveX library.
         CoUninitialize();
      }
      else
      {
         printf("CoInitialize failed\n");
      }

      return 0;
   }


   ////////////////////////////////////////////////////////////////////
   //
   //  Displays the last error -- used to show the last exception
   //  information.
   //
   void DisplayError(_com_error& error)
   {
      printf("*** DisplayError()\n");

      printf("Fatal Unexpected Error:\n");
      printf("  Error Number = %08lx\n", error.Error());

      static char errorStr[1024];
      _bstr_t desc = error.Description();

      if (desc.length() == 0)
      {
         // Don't have a description string.
         strcpy(errorStr, error.ErrorMessage());
         int nLen = lstrlen(errorStr);

         // Remove funny carriage return ctrl<M>.
         if (nLen > 2 && (errorStr[nLen - 2] == 0xd))
         {
            errorStr[nLen - 2] = '\0';
         }
      }
```

```
    else
    {
       strcpy(errorStr, desc);
    }

    printf("  Error Message = %s\n", (char*) errorStr);
}
```

Module Object

[Automation Home (see page 3)] [Objects (see page 83)]

To Access

- Instrument.GetModuleByName(Name) (see page 165)
- Modules.Item (see page 224) IndexOrName
- Modules IndexOrName

Methods

Method	Description
DoAction (see page 147)	Execute a specific XML-based command action.
DoCommands (see page 147)	Execute a particular XML-based command.
QueryCommand (see page 186)	Query for XML-based commands.
WaitComplete (see page 200)	Waits until the module's measurement completes.

Properties

Property	Description
BusSignals (see page 212)	Gets a collection of the module's defined bus/signals.
Description (see page 220)	Gets a description of the module.
Frame (see page 222)	Gets the frame in which the module resides.
Model (see page 226)	Gets the model number.
Name (see page 227)	Gets or sets the name of the module.
RunningStatus (see page 233)	Gets the detailed running status of the module.
Slot (see page 235)	Gets the module's slot location in the frame.
Status (see page 236)	Gets the status of the module.
StatusMsg (see page 237)	Gets the formatted status message.
Type (see page 241)	Gets the specific module type.

See Also

- Modules (see page 105) object

Modules Object

[Automation Home (see page 3)] [Objects (see page 83)]

To Access

- Instrument.Modules (see page 227)

Methods

There are no methods.

Properties

Property	Description
_NewEnum (see page 244)	Used by Visual Basic to support the implementation of **For Each ... Next**.
Count (see page 216)	Gets the number of modules in the collection.
Item (see page 224)	Gets one of the modules in a collection given either a slot, index, or name.

See Also

- Modules (see page 227) property
- Module (see page 105) object
- GetModuleByName (see page 165) method

PattgenModule Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 107)]

To Access

-

```
Dim variable As AgtLA.PattgenModule
Set variable = Module (see page 105)
```

Description

The PattgenModule object represents a pattern generator hardware module.

Since this object is derived from the Module (see page 105) object, a Set must be used to get to these specific methods and properties. For example:

```
' When using Visual Basic outside of the Keysight Logic Analyzer
' application, you must create the Connect object (see
page 95) and use it
' to access the Instrument object.  In this example, "myInst"
' represents the Instrument object.
'
' When "using the Advanced Customization Environment (ACE)" (in the
online help),
' the Instrument object is already created and is globally
' accessible using "AgtLA".  In this example, substitute "myInst"
' with "AgtLA" to access the global Instrument object in VBA.

' Get the PattgenModule specific object.
Dim myPattgen As AgtLA.PattgenModule
Set myPattgen = myInst.Modules(0)
MsgBox "Number of lines in main sequence: " + myPattgen.NumLines
```

Methods

Method	Description
GetLine (see page 162)	Gets an instruction or vector at line number.
GetLineLabel (see page 164)	Gets a vector's label value at line number.
InsertLine (see page 181)	Inserts a new instruction or vector after line number.
RemoveLine (see page 191)	Removes the instruction or vector at line number.
Reset (see page 191)	Resets the current line number to the first line.
Resume (see page 192)	Resumes running the pattern generator from the current line number.
Run (see page 192)	Starts running the pattern generator.

Method	Description
SetLine (see page 194)	Sets an instruction or vector at line number.
SetLineLabel (see page 194)	Sets a vector's label value at line number.
Step (see page 198)	Steps the pattern generator from the current line number.
Stop (see page 199)	Stops the pattern generator if it is currently running.

(Also Includes Module (see page 105) object methods)

Properties

Property	Description
NumLines (see page 228)	Gets the number of lines in the main sequence.

(Also Includes Module (see page 105) object properties)

PattgenModule Example

Visual Basic

```
' When using Visual Basic outside of the Keysight Logic Analyzer
' application, you must create the Connect object (see
page 95) and use it
' to access the Instrument object.  In this example, "myInst"
' represents the Instrument object.
'
' When "using the Advanced Customization Environment (ACE)" (in the
online help),
' the Instrument object is already created and is globally
' accessible using "AgtLA".  In this example, substitute "myInst"
' with "AgtLA" to access the global Instrument object in VBA.

' Load the configuration file.
myInst.Open ("C:\LA\Configs\pattgen.ala")

' Get the PattgenModule specific object.
Dim moduleName As String
moduleName = "My 16720A-1"
Dim myPattgen As AgtLA.PattgenModule
Set myPattgen = myInst.GetModuleByName(moduleName)
MsgBox moduleName + " number of lines in main sequence: " + _
      Str(myPattgen.NumLines)

' Display the pattern generator instruction or vector
' at a particular line number.
Dim myInstructionOrVector As String
myInstructionOrVector = myPattgen.GetLine(24)
MsgBox moduleName + " instruction/vector at line 24: " + _
      myInstructionOrVector

' Set the instruction or vector at a line number.
myInstructionOrVector = "Break"
myPattgen.SetLine 30, myInstructionOrVector

' Display the pattern generator label value at a line number.
Dim myLineLabel As String
Dim myLabelValue As String
```

```
myLabelValue = myPattgen.GetLineLabel(24, "My Bus 1")
MsgBox moduleName + " My Bus 1 value at line 24: " + myLabelValue

' Set the label value at a line number.
myLabelValue = "haa"
myPattgen.SetLineLabel 27, "My Bus 1", myLabelValue
MsgBox moduleName + " My Bus 1 value set at line 27: " + myLabelValue

' Insert a new instruction or vector after a line number.
myPattgen.InsertLine 1, "Vector 'My Bus 1' = h11"
MsgBox moduleName + " line inserted after vector 1"

' Remove a range of lines.
myPattgen.RemoveLine ("5..12")
MsgBox moduleName + " vectors from lines 5 through 12 removed"

' Remove all lines.
myPattgen.RemoveLine ("All")
MsgBox moduleName + " all vectors removed"
```

Visual C++

```
//
//  This simple Visual C++ Console application demonstrates how to use
//  the Keysight 168x/169x/169xx COM interface to control a pattern
//  generator module.
//
//  This project was created in Visual C++ Developer.  To create a
//  similar project:
//
//    - Execute File -> New
//    - Select the Projects tab
//    - Select "Win32 Console Application"
//    - Select A "hello,World!" application (Visual Studio 6.0)
//
//  To make this buildable, you need to specify your "import" path
//  in stdafx.h (search for "TODO" in that file).  For example, add:
//  #import "C:/Program Files/Keysight Technologies/Logic Analyzer/LA \
//  COM Automation/agClientSvr.dll"
//
//  To run, you need to specify the host logic analyzer to connect
//  to (search for "TODO" below).
//

#include "stdafx.h"


////////////////////////////////////////////////////////////////////
//
//  Forward declarations.
//
void DisplayError(_com_error& err);


////////////////////////////////////////////////////////////////////
//
//  main() entry point.
//
int main(int argc, char* argv[])
```

```
{
   printf("*** Main()\n");

   //
   //  Initialize the Microsoft COM/ActiveX library.
   //
   HRESULT hr = CoInitialize(0);

   if (SUCCEEDED(hr))
   {
      try {   // Catch any unexpected run-time errors.
         _bstr_t hostname = "mtx33";   // TODO, use your logic
                                       // analysis system hostname.
         printf("Connecting to instrument '%s'\n", (char*) hostname);

         // Create the connect object and get the instrument object.
         AgtLA::IConnectPtr pConnect =
               AgtLA::IConnectPtr(__uuidof(AgtLA::Connect));
         AgtLA::IInstrumentPtr pInst =
               pConnect->GetInstrument(hostname);

         // Load the configuration file.
         _bstr_t configFile = "C:\\LA\\Configs\\pattgen.ala";
         printf("Loading the config file '%s'\n", (char*) configFile);
         pInst->Open(configFile, FALSE, "", TRUE);

         // Get the PattgenModule specific object.
         _bstr_t moduleName = "My 16720A-1";
         AgtLA::IPattgenModulePtr pPattgen =
               pInst->GetModuleByName(moduleName);

         // Display the pattern generator instruction or vector
         // at a particular line number.
         _bstr_t myInstructionOrVector;
         myInstructionOrVector = pPattgen->GetLine(24);
         printf("%s instruction/vector at line 24 = '%s'\n",
               (char *) moduleName, (char*) myInstructionOrVector);

         // Set the instruction or vector at a line number.
         myInstructionOrVector = "Break";
         pPattgen->SetLine(30, myInstructionOrVector);

         // Display the pattern generator label value at a line number.
         _bstr_t myLabelValue;
         myLabelValue = pPattgen->GetLineLabel(24, "My Bus 1");
         printf("%s My Bus 1 value at line 24 = '%s'\n",
               (char *) moduleName, (char*) myLabelValue);

         // Set the label value at a line number.
         myLabelValue = "haa";
         pPattgen->SetLineLabel(27, "My Bus 1", myLabelValue);
         printf("%s My Bus 1 value set at line 27 = '%s'\n",
               (char *) moduleName, (char*) myLabelValue);

         // Insert a new instruction or vector after a line number.
         pPattgen->InsertLine(1, "Vector 'My Bus 1' = h11");
         printf("%s line inserted after vector 1\n",
```

```
                (char *) moduleName);

            // Remove a range of lines.
            pPattgen->RemoveLine("5..12");
            printf("%s vectors from lines 5 through 12 removed\n",
                (char *) moduleName);

            // Remove all lines.
            pPattgen->RemoveLine("All");
            printf("%s all vectors removed\n", (char *) moduleName);

         }
         catch (_com_error& e) {
            DisplayError(e);
         }

         // Uninitialize the Microsoft COM/ActiveX library.
         CoUninitialize();
      }
      else
      {
         printf("CoInitialize failed\n");
      }

      return 0;
}


////////////////////////////////////////////////////////////////////
//
//  Displays the last error -- used to show the last exception
//  information.
//
void DisplayError(_com_error& error)
{
   printf("*** DisplayError()\n");

   printf("Fatal Unexpected Error:\n");
   printf("  Error Number = %08lx\n", error.Error());

   static char errorStr[1024];
   _bstr_t desc = error.Description();

   if (desc.length() == 0)
   {
      // Don't have a description string.
      strcpy(errorStr, error.ErrorMessage());
      int nLen = lstrlen(errorStr);

      // Remove funny carriage return ctrl<M>.
      if (nLen > 2 && (errorStr[nLen - 2] == 0xd))
      {
         errorStr[nLen - 2] = '\0';
      }
   }
   else
   {
```

```
        strcpy(errorStr, desc);
    }

    printf("  Error Message = %s\n", (char*) errorStr);
}
```

Probe Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 111)]

To Access

- Instrument.GetProbeByName(Name) (see page 168)
- Probes.Item (see page 224) IndexOrName
- Probes IndexOrName

Methods

Method	Description
DoAction (see page 147)	Execute a specific XML-based command action.
DoCommands (see page 147)	Execute a particular XML-based command.
QueryCommand (see page 186)	Query for XML-based commands.

Properties

Property	Description
Name (see page 227)	Gets or sets the name of the probe.
Type (see page 241)	Gets the probe's type.

See Also

- Probes (see page 111) object

Probes Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 111)]

To Access

- Instrument.Probes (see page 231)

Methods

There are no methods.

Properties

Property	Description
_NewEnum (see page 244)	Used by Visual Basic to support the implementation of **For Each ... Next**.
Count (see page 216)	Gets the number of probes in the collection.
Item (see page 224)	Gets one of the probes in the collection given either an index or name.

See Also

- Probes (see page 231) property
- Probe (see page 111) object
- GetProbeByName (see page 168) method

Probes Example

Visual Basic

```
' When using Visual Basic outside of the Keysight Logic Analyzer
' application, you must create the Connect object (see
page 95) and use it
```

```
' to access the Instrument object.  In this example, "myInst"
' represents the Instrument object.
'
' When "using the Advanced Customization Environment (ACE)" (in the
online help),
' the Instrument object is already created and is globally
' accessible using "AgtLA".  In this example, substitute "myInst"
' with "AgtLA" to access the global Instrument object in VBA.

' Display all of the probe names.
Dim myProbeNames As String
Dim myProbe As AgtLA.Probe

For Each myProbe in myInst.Probes
   ' Add the probe's name to the string.
   myProbeNames = myProbeNames + vbNewLine + myProbe.Name
Next
MsgBox "Probe names: " + myProbeNames
```

Visual C++

```
//
//  This simple Visual C++ Console application demonstrates how to use
//  the Keysight 168x/169x/169xx COM interface to display all the probe
//  names.
//
//  This project was created in Visual C++ Developer.  To create a
//  similar project:
//
//    - Execute File -> New
//    - Select the Projects tab
//    - Select "Win32 Console Application"
//    - Select A "hello,World!" application (Visual Studio 6.0)
//
//  To make this buildable, you need to specify your "import" path
//  in stdafx.h (search for "TODO" in that file).  For example, add:
//  #import "C:/Program Files/Keysight Technologies/Logic Analyzer/LA \
//  COM Automation/agClientSvr.dll"
//
//  To run, you need to specify the host logic analyzer to connect
//  to (search for "TODO" below).
//

#include "stdafx.h"


//////////////////////////////////////////////////////////////////////
//
//  Forward declarations.
//
void DisplayError(_com_error& err);


//////////////////////////////////////////////////////////////////////
//
//  main() entry point.
//
int main(int argc, char* argv[])
{
```

```
   printf("*** Main()\n");

   //
   //  Initialize the Microsoft COM/ActiveX library.
   //
   HRESULT hr = CoInitialize(0);

   if (SUCCEEDED(hr))
   {
      try {   // Catch any unexpected run-time errors.
         _bstr_t hostname = "mtx33";   // TODO, use your logic
                                       // analysis system hostname.
         printf("Connecting to instrument '%s'\n", (char*) hostname);

         // Create the connect object and get the instrument object.
         AgtLA::IConnectPtr pConnect =
               AgtLA::IConnectPtr(__uuidof(AgtLA::Connect));
         AgtLA::IInstrumentPtr pInst =
               pConnect->GetInstrument(hostname);

         // Load the configuration file.
         _bstr_t configFile = "C:\\LA\\Configs\\probes.ala";
         printf("Loading the config file '%s'\n", (char*) configFile);
         pInst->Open(configFile, FALSE, "", TRUE);

         // Display all of the probe names.
         AgtLA::IProbesPtr pProbes = pInst->GetProbes();
         for (long i = 0; i < pProbes->GetCount(); i++)
         {
            AgtLA::IProbePtr pProbe = pProbes->GetItem(i);
            _bstr_t name = pProbe->GetName();
            printf("Probe name = %s\n", (char*) name);
         }
      }
      catch (_com_error& e) {
         DisplayError(e);
      }

      // Uninitialize the Microsoft COM/ActiveX library.
      CoUninitialize();
   }
   else
   {
      printf("CoInitialize failed\n");
   }

   return 0;
}


//////////////////////////////////////////////////////////////////////
//
//  Displays the last error -- used to show the last exception
//  information.
//
void DisplayError(_com_error& error)
{
```

```
   printf("*** DisplayError()\n");

   printf("Fatal Unexpected Error:\n");
   printf("  Error Number = %08lx\n", error.Error());

   static char errorStr[1024];
   _bstr_t desc = error.Description();

   if (desc.length() == 0)
   {
      // Don't have a description string.
      strcpy(errorStr, error.ErrorMessage());
      int nLen = lstrlen(errorStr);

      // Remove funny carriage return ctrl<M>.
      if (nLen > 2 && (errorStr[nLen - 2] == 0xd))
      {
         errorStr[nLen - 2] = '\0';
      }
   }
   else
   {
      strcpy(errorStr, desc);
   }

   printf("  Error Message = %s\n", (char*) errorStr);
}
```

ProtocolWindow Object

[Automation Home (see page 3)] [Objects (see page 83)]

To Access ·

```
Dim variable As AgtLA.ProtocolWindow
Set variable = Window (see page 136)
```

Description The ProtocolWindow object represents an output window for viewing protocol data from a serial analyzer.

Methods

Method	Description
GetProtocolDataFields (see page 168)	Gets the acquisition data for the fields displayed in the Protocol Viewer.
WriteProtocolDataFieldsToFile (see page 204)	Writes the acquisition data displayed in various fields in the Protocol Viewer to a specified CSV file.
GetTriggerSampleNumber (see page 173)	Gets the packet number and channel of the trigger packet.

(Also includes Window object's methods)

SampleBusSignalData Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 115)]

To Access ·

```
Dim variable As AgtLA.SampleBusSignalData
Set variable = BusSignalData (see page 86)
```

Description

The SampleBusSignalData object represents the data associated with a bus/signal. The data can be uploaded using the methods GetDataBySample (see page 159) and GetDataByTime (see page 161).

Since this object is derived from the BusSignalData (see page 86) object, a Set must be used to get to these specific methods and properties. For example:

```
' When using Visual Basic outside of the Keysight Logic Analyzer
' application, you must create the Connect object (see
page 95) and use it
' to access the Instrument object.  In this example, "myInst"
' represents the Instrument object.
'
' When "using the Advanced Customization Environment (ACE)" (in the
online help),
' the Instrument object is already created and is globally
' accessible using "AgtLA".  In this example, substitute "myInst"
' with "AgtLA" to access the global Instrument object in VBA.

' Get the AnalyzerModule specific object.
Dim myData As AgtLA.SampleBusSignalData
Set myData = myInst.Modules(0).BusSignals(0).BusSignalData
MsgBox "Sample Range: " + myData.StartSample + ".." + myData.EndSample
```

Methods

Method	Description
GetDataBySample (see page 159)	Given a sample range, returns an array of data.
GetDataByTime (see page 161)	Given a time range, returns an array of data.
GetNumSamples (see page 168)	Given a range, returns the number of samples stored.
GetSampleNumByTime (see page 172)	Gets the closest sample number corresponding to the time given.
GetTime (see page 172)	Given a range, returns the time for this bus/signal in the format specified by the data type given.

Properties

Property	Description
DataType (see page 220)	Gets the recommended bus/signal data type.
EndSample (see page 221)	Gets the data's ending sample number relative to trigger.
EndTime (see page 221)	Gets the data's ending time relative to trigger.
StartSample (see page 235)	Gets the data's starting sample number relative to trigger.
StartTime (see page 236)	Gets the data's starting time relative to trigger.

SampleBusSignalData Example

Visual Basic

```
' When using Visual Basic outside of the Keysight Logic Analyzer
' application, you must create the Connect object (see
page 95) and use it
' to access the Instrument object.  In this example, "myInst"
' represents the Instrument object.
```

```
'
' When "using the Advanced Customization Environment (ACE)" (in the
online help),
' the Instrument object is already created and is globally
' accessible using "AgtLA".  In this example, substitute "myInst"
' with "AgtLA" to access the global Instrument object in VBA.

' Run the measurement, wait for it to complete.
myInst.Run
myInst.WaitComplete (20)

' Display all of the bus/signal data.
Dim myString As String
Dim printHeader As Boolean
Dim myBusSignals As AgtLA.BusSignals
Set myBusSignals = myInst.GetModuleByName("My 1690A-1").BusSignals
Dim myBusSignal As AgtLA.BusSignal
Dim myData As AgtLA.SampleBusSignalData

Dim myNumDataRows As Long
Dim myStartSample As Long
Dim myEndSample As Long
Dim i As Long

printHeader = True
myStartSample = -5   ' Sample range to upload.
myEndSample = 5

For Each myBusSignal In myBusSignals
   Set myData = myBusSignal.BusSignalData

   If printHeader = True Then
      myString = myString + "Sample range: " + _
            Str(myData.StartSample) + ".." + Str(myData.EndSample)
      myString = myString + ", Time range: " + _
            Str(myData.StartTime) + ".." + Str(myData.EndTime) + _
            vbNewLine
      printHeader = False
   End If

   ' Print the bus/signal information.
   myString = myString + vbNewLine + "Name: " + myBusSignal.Name
   myString = myString + ", BitSize=" + Str(myBusSignal.BitSize) + _
         ", ByteSize=" + Str(myBusSignal.ByteSize) + vbNewLine

   ' Print the bus/signal data.
   Select Case myBusSignal.BusSignalType
      Case AgtBusSignalSampleNum
         Dim lArray() As Long
         lArray = myData.GetDataBySample(myStartSample, myEndSample, _
               AgtDataLong, myNumDataRows)
         For i = 0 To myNumDataRows - 1
            myString = myString + Str(lArray(i)) + " "
         Next i
      Case AgtBusSignalTime
         Dim dArray() As Double
         dArray = myData.GetDataBySample(myStartSample, myEndSample, _
```

```
                  AgtDataTime, myNumDataRows)
            For i = 0 To myNumDataRows - 1
               myString = myString + Str(dArray(i)) + " "
            Next i
         Case AgtBusSignalGenerated
            ' Decimal holds a maximum of 96 bits unsigned.
            Dim vArray As Variant
            vArray = myData.GetDataBySample(myStartSample, myEndSample, _
                  AgtDataDecimal, myNumDataRows)
            For i = 0 To myNumDataRows - 1
               myString = myString + Str(vArray(i)) + " "
            Next i
         Case AgtBusSignalProbed
            ' Use the data type that is appropriate for your bus width:
            '  - AgtDataLong holds a maximum of 31 bits unsigned.
            '  - AgtDataDouble holds a maximum of 52 bits unsigned.
            '  - AgtDataDecimal holds a maximum of 96 bits unsigned.
            lArray = myData.GetDataBySample(myStartSample, myEndSample, _
                  AgtDataLong, myNumDataRows)
            For i = 0 To myNumDataRows - 1
               myString = myString + Hex$(lArray(i)) + " "
            Next i
      End Select
   Next
   MsgBox myString
```

Visual C++

```
//
//  This simple Visual C++ Console application demonstrates how to use
//  the Keysight 168x/169x/169xx COM interface to display captured data.
//
//  This project was created in Visual C++ Developer.  To create a
//  similar project:
//
//    - Execute File -> New
//    - Select the Projects tab
//    - Select "Win32 Console Application"
//    - Select A "hello,World!" application (Visual Studio 6.0)
//
//  To make this buildable, you need to specify your "import" path
//  in stdafx.h (search for "TODO" in that file).  For example, add:
//  #import "C:/Program Files/Keysight Technologies/Logic Analyzer/LA \
//  COM Automation/agClientSvr.dll"
//
//  To run, you need to specify the host logic analyzer to connect
//  to (search for "TODO" below).
//

#include "stdafx.h"


////////////////////////////////////////////////////////////////////
//
//  Forward declarations.
//
void DisplayRawData(
  _bstr_t&     busSignalName,
  _variant_t&  rawDataArray,
```

```
  long         numBytesPerRow);

void DisplayBusSignalData(
  _bstr_t&     busSignalName,
  _variant_t&  busSignalArray);

void DisplayError(_com_error& err);


//////////////////////////////////////////////////////////////////////
//
//  main() entry point.
//
int main(int argc, char* argv[])
{
   printf("*** Main()\n");

   //
   //  Initialize the Microsoft COM/ActiveX library.
   //
   HRESULT hr = CoInitialize(0);

   if (SUCCEEDED(hr))
   {
      try {   // Catch any unexpected run-time errors.
         _bstr_t hostname = "mtx33";   // TODO, use your logic
                                       // analysis system hostname.
         printf("Connecting to instrument '%s'\n", (char*) hostname);

         // Create the connect object and get the instrument object.
         AgtLA::IConnectPtr pConnect =
               AgtLA::IConnectPtr(__uuidof(AgtLA::Connect));
         AgtLA::IInstrumentPtr pInst =
               pConnect->GetInstrument(hostname);

         // Load the configuration file.
         _bstr_t configFile = "C:\\LA\\Configs\\config.ala";
         printf("Loading the config file '%s'\n", (char*) configFile);
         pInst->Open(configFile, FALSE, "", TRUE);

         // Run the measurement, wait for it to complete.
         pInst->Run(FALSE);
         pInst->WaitComplete(20);

         // Get data from the Listing window.
         _bstr_t windowName = "Listing-1";
         AgtLA::IWindowPtr pWindow = pInst->GetWindowByName(windowName);

         // For each bus/signal, display a range of data.
         long start = -10;
         long end = 10;
         _variant_t data;
         long numRowsRet;
         long numBytesPerRow;
         AgtLA::IBusSignalsPtr pBusSignals = pWindow->GetBusSignals();
         printf("\n");
         for (long i = 0; i < pBusSignals->GetCount(); i++)
```

```
{
   // Get the data for the bus/signal.
   AgtLA::IBusSignalPtr pBusSignal =
         pWindow->GetBusSignals()->GetItem(i);
   _bstr_t busSignal = pBusSignal->GetName();
   printf("Bus/signal: '%s'\n", (char*) busSignal);
   AgtLA::ISampleBusSignalDataPtr pSampleData =
         pBusSignal->GetBusSignalData();

   switch(pBusSignal->GetBusSignalType())
   {
   case AgtLA::AgtBusSignalProbed:
      {
         printf("  Type: 'AgtBusSignalProbed'\n");
         // "raw" and "long" formats supported.
         if (pBusSignal->GetBitSize() > 32) {
            data = pSampleData->GetDataBySample(start, end,
                  AgtLA::AgtDataRaw, &numRowsRet);
            numBytesPerRow = pBusSignal->GetByteSize();
            printf("  Data type: 'AgtDataRaw' ");
            printf("(%d bytes/row)\n", numBytesPerRow);
            DisplayRawData(busSignal, data, numBytesPerRow);
         }
         else {
            data = pSampleData->GetDataBySample(start, end,
                  AgtLA::AgtDataLong, &numRowsRet);
            printf("  Data type: 'AgtDataLong'\n");
            DisplayBusSignalData(busSignal, data);
         }
      }
      break;

   case AgtLA::AgtBusSignalGenerated:
      {
         printf("  Type: 'AgtBusSignalGenerated'\n");
         data = pSampleData->GetDataBySample(start, end,
               AgtLA::AgtDataStringHex, &numRowsRet);
         printf("  Data type: 'AgtDataStringHex'\n");
         DisplayBusSignalData(busSignal, data);
      }
      break;

   case AgtLA::AgtBusSignalSampleNum:
      {
         printf("  Type: 'AgtBusSignalSampleNum'\n");
         data = pSampleData->GetDataBySample(start, end,
               AgtLA::AgtDataLong, &numRowsRet);
         printf("  Data type: 'AgtDataLong'\n");
         DisplayBusSignalData(busSignal, data);
      }
      break;

   case AgtLA::AgtBusSignalTime:
      {
         printf("  Type: 'AgtBusSignalTime'\n");
         data = pSampleData->GetDataBySample(start, end,
               AgtLA::AgtDataTime, &numRowsRet);
```

```
                  printf("  Data type: 'AgtDataTime'\n");
                  DisplayBusSignalData(busSignal, data);
               }

            default:
               break;

            }
         }
      }
      catch (_com_error& e) {
         DisplayError(e);
      }

      // Uninitialize the Microsoft COM/ActiveX library.
      CoUninitialize();
   }
   else
   {
      printf("CoInitialize failed\n");
   }

   return 0;
}


//////////////////////////////////////////////////////////////////////
//
//  Displays the data in raw data format.
//
void DisplayRawData(_bstr_t& busSignalName,
                    _variant_t& varArray,
                    long numBytesPerRow)
{
   long numSamples;
   long lBound;
   HRESULT hr = SafeArrayGetLBound(varArray.parray, 1, &lBound);

   if (SUCCEEDED(hr))
   {
      long uBound;
      hr = SafeArrayGetUBound(varArray.parray, 1, &uBound);

      if (SUCCEEDED(hr))
      {
         printf("  Variant data format: VT_UI1 (unsigned char)\n");
         byte* pByteArray;
         hr = SafeArrayAccessData(varArray.parray,
               (void**) &pByteArray);

         if (SUCCEEDED(hr))
         {
            numSamples = (uBound - lBound + 1) / numBytesPerRow;
            byte* pByte = pByteArray;

            for (int i = 0; i < numSamples; i++)
            {
```

```
                printf("    dataArray[%d]: ", i);

                for (int j = 0; j < numBytesPerRow; j++)
                {
                   printf("%02x ", pByte[j]);
                }

                pByte += numBytesPerRow;
                printf("\n");
             }

             printf("\n");
             SafeArrayUnaccessData(varArray.parray);
          }
       }
    }
}


////////////////////////////////////////////////////////////////////
//
//  Displays bus/signal data in the given array.
//
void DisplayBusSignalData(_bstr_t& busSignalName,
                          _variant_t& varArray)
{
   signed   _int8*   pArrayInt8   = NULL;
   unsigned _int8*   pArrayUInt8  = NULL;
   signed   _int16*  pArrayInt16  = NULL;
   unsigned _int16*  pArrayUInt16 = NULL;
   signed   _int32*  pArrayInt32  = NULL;
   unsigned _int32*  pArrayUInt32 = NULL;
   signed   _int64*  pArrayInt64  = NULL;
   unsigned _int64*  pArrayUInt64 = NULL;
   double*           pArrayDouble = NULL;
   BSTR*             pArrayBstr   = NULL;

   SAFEARRAY* pDataArray = varArray.parray;

   long lBound;
   HRESULT hr = SafeArrayGetLBound(pDataArray, 1, &lBound);

   if (FAILED(hr))
   {
      printf("SafeArrayGetLBound failed\n");
   }

   long uBound;
   hr = SafeArrayGetUBound(pDataArray, 1, &uBound);

   if (FAILED(hr))
   {
      printf("SafeArrayGetUBound failed\n");
   }

   long numSamples = uBound - lBound + 1;
```

```
switch (varArray.vt - VT_ARRAY)
{
case VT_I1:
   {
      printf("  Variant data format: VT_I1 (char)\n");
      hr = SafeArrayAccessData(pDataArray, (void**) &pArrayInt8);

      for (int i = lBound; i <= uBound; i++)
      {
         printf("    dataArray[%d]: %02cx\n", i, pArrayInt8[i]);
      }
      break;
   }

case VT_UI1:
   {
      printf("  Variant data format: VT_UI1 (unsigned char)\n");
      hr = SafeArrayAccessData(pDataArray, (void**) &pArrayUInt8);

      for (int i = lBound; i <= uBound; i++)
      {
         printf("    dataArray[%d]: %02cx\n", i, pArrayUInt8[i]);
      }
      break;
   }

case VT_I2:
   {
      printf("  Variant data format: VT_I2 (short)\n");
      hr = SafeArrayAccessData(pDataArray, (void**) &pArrayInt16);

      for (int i = lBound; i <= uBound; i++)
      {
         printf("    dataArray[%d]: %04hx\n", i, pArrayInt16[i]);
      }
      break;
   }

case VT_UI2:
   {
      printf("  Variant data format: VT_UI2 (unsigned short)\n");
      hr = SafeArrayAccessData(pDataArray, (void**) &pArrayUInt16);

      for (int i = lBound; i <= uBound; i++)
      {
         printf("    dataArray[%d]: %04hx\n", i, pArrayUInt16[i]);
      }
      break;
   }

case VT_I4:
   {
      printf("  Variant data format: VT_I4 (long)\n");
      hr = SafeArrayAccessData(pDataArray, (void**) &pArrayInt32);

      for (int i = lBound; i <= uBound; i++)
      {
```

```
            printf("    dataArray[%d]: %08lx\n", i, pArrayInt32[i]);
         }
         break;
      }

   case VT_UI4:
      {
         printf("  Variant data format: VT_UI4 (unsigned long)\n");
         hr = SafeArrayAccessData(pDataArray, (void**) &pArrayUInt32);

         for (int i = lBound; i <= uBound; i++)
         {
            printf("    dataArray[%d]: %08lx\n", i, pArrayUInt32[i]);
         }
         break;
      }

   case VT_I8:
      {
         printf("  Variant data format: VT_I8 (__int64)\n");
         hr = SafeArrayAccessData(pDataArray, (void**) &pArrayInt64);

         for (int i = lBound; i <= uBound; i++)
         {
            printf("    dataArray[%d]: %016I64x\n", i, pArrayInt64[i]);
         }
         break;
      }

   case VT_UI8:
      {
         printf("  Variant data format: VT_UI8 (unsigned __int64)\n");
         hr = SafeArrayAccessData(pDataArray, (void**) &pArrayUInt64);

         for (int i = lBound; i <= uBound; i++)
         {
            printf("    dataArray[%d]: %016I64x\n", i, pArrayUInt64[i]);
         }
         break;
      }

   case VT_R8:
      {
         printf("  Variant data format: VT_R8 (double)\n");
         hr = SafeArrayAccessData(pDataArray, (void**) &pArrayDouble);

         for (int i = lBound; i <= uBound; i++)
         {
            printf("    dataArray[%d]: %0le\n", i, pArrayDouble[i]);
         }
         break;
      }

   case VT_BSTR:
      {
         printf("  Variant data format: VT_BSTR (_bstr_t)\n");
         hr = SafeArrayAccessData(pDataArray, (void**) &pArrayBstr);
```

```
            for (int i = lBound; i <= uBound; i++)
            {
               printf("    dataArray[%d]: %S\n", i, pArrayBstr[i]);
            }
            break;
         }

      default:
         {
            printf("  Variant data format: unknown\n");
            hr = E_FAIL;
            break;
         }
      }

      if (FAILED(hr))
      {
         printf("SafeArrayAccessData failed\n");
      }

      printf("\n");
      SafeArrayUnaccessData(pDataArray);
   }


   ////////////////////////////////////////////////////////////////////
   //
   //  Displays the last error -- used to show the last exception
   //  information.
   //
   void DisplayError(_com_error& error)
   {
      printf("*** DisplayError()\n");

      printf("Fatal Unexpected Error:\n");
      printf("  Error Number = %08lx\n", error.Error());

      static char errorStr[1024];
      _bstr_t desc = error.Description();

      if (desc.length() == 0)
      {
         // Don't have a description string.
         strcpy(errorStr, error.ErrorMessage());
         int nLen = lstrlen(errorStr);

         // Remove funny carriage return ctrl<M>.
         if (nLen > 2 && (errorStr[nLen - 2] == 0xd))
         {
            errorStr[nLen - 2] = '\0';
         }
      }
      else
      {
         strcpy(errorStr, desc);
      }
```

```
    printf("  Error Message = %s\n", (char*) errorStr);
}
```

SampleDifference Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 87)]

To Access

- SampleDifferences.Item (see page 224) IndexOrName
- SampleDifferences IndexOrName

Methods There are no methods.

Properties

Property	Description
BusSignalDifferences (see page 212)	Gets a collection of all the buses/signals with differences for this sample.
SampleNum (see page 233)	Gets the sample number at which differences occurred.

See Also

- SampleDifferences (see page 125) object

SampleDifferences Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 87)]

To Access

- CompareWindow.SampleDifferences (see page 233)

Methods There are no methods.

Properties

Property	Description
_NewEnum (see page 244)	Used by Visual Basic to support the implementation of **For Each ... Next**.
Count (see page 216)	Gets the number of bus/signal differences in the collection.
Item (see page 224)	Given an index into the collection, gets a SampleDifference (see page 125) object from the collection.

See Also

- SampleDifferences (see page 233) property

SelfTest Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 125)]

To Access

- Instrument.SelfTest (see page 234)

Methods

Method	Description
TestAll (see page 199)	Runs an instrument's self-tests.

Properties There are no properties.

See Also

- SelfTest (see page 234) property

SelfTest Example

The following script runs all of the tests available on the target instrument:

Visual Basic

```
Dim result As String
result = theInstrument.SelfTest.TestAll()
```

Visual C++

```
//
//  This simple Visual C++ Console application demonstrates how to
//  use the Keysight 168x/169x/169xx COM interface to run the logic
//  analysis system's self tests.
//
//  This project was created in Visual C++ Developer.  To create a
//  similar project:
//
//    - Execute File -> New
//    - Select the Projects tab
//    - Select "Win32 Console Application"
//    - Select A "hello,World!" application (Visual Studio 6.0)
//
//  To make this buildable, you need to specify your "import" path
//  in stdafx.h (search for "TODO" in that file).  For example, add:
//  #import "C:/Program Files/Keysight Technologies/Logic Analyzer/LA \
//  COM Automation/agClientSvr.dll"
//
//  To run, you need to specify the host logic analyzer to connect
//  to (search for "TODO" below).
//

#include "stdafx.h"


////////////////////////////////////////////////////////////////////
//
//  Forward declarations.
//
void DisplayError(_com_error& err);


////////////////////////////////////////////////////////////////////
//
//  main() entry point.
//
int main(int argc, char* argv[])
{
   printf("*** Main()\n");

   //
   //  Initialize the Microsoft COM/ActiveX library.
   //
   HRESULT hr = CoInitialize(0);

   if (SUCCEEDED(hr))
   {
      try {   // Catch any unexpected run-time errors.
         _bstr_t hostname = "col-mil20";   // TODO, use your logic
                                           // analysis system hostname.
         printf("Connecting to instrument '%s'\n", (char*) hostname);
```

```
            // Create the connect object and get the instrument object.
            AgtLA::IConnectPtr pConnect =
                  AgtLA::IConnectPtr(__uuidof(AgtLA::Connect));
            AgtLA::IInstrumentPtr pInst =
                  pConnect->GetInstrument(hostname);


            // Run the logic analysis system self tests and print the
            // results.
            AgtLA::ISelfTestPtr pSelfTest = pInst->GetSelfTest();
            _bstr_t testResults = pSelfTest->TestAll();
            printf("Self test results: %s\n", (char*) testResults);
         }
         catch (_com_error& e) {
            DisplayError(e);
         }

         // Uninitialize the Microsoft COM/ActiveX library.
         CoUninitialize();
      }
      else
      {
         printf("CoInitialize failed\n");
      }

      return 0;
   }


   ////////////////////////////////////////////////////////////////////
   //
   //  Displays the last error -- used to show the last exception
   //  information.
   //
   void DisplayError(_com_error& error)
   {
      printf("*** DisplayError()\n");

      printf("Fatal Unexpected Error:\n");
      printf("  Error Number = %08lx\n", error.Error());

      static char errorStr[1024];
      _bstr_t desc = error.Description();

      if (desc.length() == 0)
      {
         // Don't have a description string.
         strcpy(errorStr, error.ErrorMessage());
         int nLen = lstrlen(errorStr);

         // Remove funny carriage return ctrl<M>.
         if (nLen > 2 && (errorStr[nLen - 2] == 0xd))
         {
            errorStr[nLen - 2] = '\0';
         }
      }
      else
```

```
    {
       strcpy(errorStr, desc);
    }

    printf("  Error Message = %s\n", (char*) errorStr);
}
```

SerialModule Object

[Automation Home (see page 3)] [Objects (see page 83)]

To Access

```
Dim variable As AgtLA.SerialModule
Set variable = Module (see page 105)
```

Description

The SerialModule object represents a hardware measurement module for viewing and analyzing serial data.

Since this object is derived from the Module (see page 105) object, a Set must be used to get to these specific methods and properties. For example:

```
' When using Visual Basic outside of the Keysight Logic Analyzer
' application, you must create the Connect object (see
page 95) and use it
' to access the Instrument object.  In this example, "myInst"
' represents the Instrument object.
'
' When "using the Advanced Customization Environment (ACE)" (in the
online help),
' the Instrument object is already created and is globally
' accessible using "AgtLA".  In this example, substitute "myInst"
' with "AgtLA" to access the global Instrument object in VBA.

' Get the SerialModule specific object.
Dim myAnalyzer As AgtLA.SerialModule
Set myAnalyzer = myInst.Modules(0)
MsgBox "Trigger: " + myAnalyzer.Trigger
```

Methods

Method	Description
RecallTriggerByFile (see page 188)	Loads a previously saved trigger file located on the instrument file system.

(Also Includes Module (see page 105) object methods)

Tool Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 129)]

To Access

- Instrument.GetToolByName(Name) (see page 173)
- Tools.Item (see page 224) IndexOrName
- Tools IndexOrName

Methods

Method	Description
DoAction (see page 147)	Execute a specific XML-based command action.
DoCommands (see page 147)	Execute a particular XML-based command.
QueryCommand (see page 186)	Query for XML-based commands.

Properties

Property	Description
BusSignals (see page 212)	Gets a collection of the tool's defined bus/signals.
Name (see page 227)	Gets or sets the name of the tool.
Type (see page 241)	Gets the specific tool type.

See Also

- Tools (see page 129) object

Tools Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 129)]

To Access

- Instrument.Tools (see page 240)

Methods

There are no methods.

Properties

Property	Description
_NewEnum (see page 244)	Used by Visual Basic to support the implementation of **For Each ... Next**.
Count (see page 216)	Gets the number of tools in the collection.
Item (see page 224)	Gets one of the tools in the collection given either an index or name.

See Also

- Tools (see page 240) property
- Tool (see page 128) object
- GetToolByName (see page 173) method

Tools Example

Visual Basic

```
' When using Visual Basic outside of the Keysight Logic Analyzer
' application, you must create the Connect object (see
page 95) and use it
' to access the Instrument object.  In this example, "myInst"
' represents the Instrument object.
'
' When "using the Advanced Customization Environment (ACE)" (in the
online help),
' the Instrument object is already created and is globally
' accessible using "AgtLA".  In this example, substitute "myInst"
' with "AgtLA" to access the global Instrument object in VBA.

' Display all of the tool names.
Dim myToolNames As String
Dim myTool As AgtLA.Tool
```

```
For Each myTool in myInst.Tools
   ' Add the tool's name to the string.
   myToolNames = myToolNames + vbNewLine + myTool.Name
Next
MsgBox "Tool names: " + myToolNames

' Get the MPC8XX Inverse Assembler tool; then,
' execute the QueryCommand.
Dim XMLCmdResponse As String
If myInst.GetToolByName("Motorola PowerQUICC (MPC8XX) Inverse " + _
      "Assembler-1").QueryCommand("GetProperties", XMLCmdResponse) _
      Then
   MsgBox "MPC8XX IA Properties: " + XMLCmdResponse
End If
```

Visual C++

```
//
//  This simple Visual C++ Console application demonstrates how to use
//  the Keysight 168x/169x/169xx COM interface to display all the tool
//  names and, with a specific tool, execute a QueryCommand to get the
//  tool's properties.
//
//  This project was created in Visual C++ Developer.  To create a
//  similar project:
//
//    - Execute File -> New
//    - Select the Projects tab
//    - Select "Win32 Console Application"
//    - Select A "hello,World!" application (Visual Studio 6.0)
//
//  To make this buildable, you need to specify your "import" path
//  in stdafx.h (search for "TODO" in that file).  For example, add:
//  #import "C:/Program Files/Keysight Technologies/Logic Analyzer/LA \
//  COM Automation/agClientSvr.dll"
//
//  To run, you need to specify the host logic analyzer to connect
//  to (search for "TODO" below).
//

#include "stdafx.h"


////////////////////////////////////////////////////////////////////////
//
//  Forward declarations.
//
void DisplayError(_com_error& err);


////////////////////////////////////////////////////////////////////////
//
//  main() entry point.
//
int main(int argc, char* argv[])
{
   printf("*** Main()\n");

   //
```

```
//  Initialize the Microsoft COM/ActiveX library.
//
HRESULT hr = CoInitialize(0);

if (SUCCEEDED(hr))
{
   try {   // Catch any unexpected run-time errors.
      _bstr_t hostname = "mtx33";   // TODO, use your logic
                                    // analysis system hostname.
      printf("Connecting to instrument '%s'\n", (char*) hostname);

      // Create the connect object and get the instrument object.
      AgtLA::IConnectPtr pConnect =
            AgtLA::IConnectPtr(__uuidof(AgtLA::Connect));
      AgtLA::IInstrumentPtr pInst =
            pConnect->GetInstrument(hostname);

      // Load the configuration file.
      _bstr_t configFile = "C:\\LA\\Configs\\config.ala";
      printf("Loading the config file '%s'\n", (char*) configFile);
      pInst->Open(configFile, FALSE, "", TRUE);

      // Display all of the tool names.
      AgtLA::IToolsPtr pTools = pInst->GetTools();
      for (long i = 0; i < pTools->GetCount(); i++)
      {
         AgtLA::IToolPtr pTool = pTools->GetItem(i);
         _bstr_t name = pTool->GetName();
         printf("Tool name = %s\n", (char*) name);
      }

      // Get the MPC8XX Inverse Assembler tool; then,
      // execute the QueryCommand.
      _bstr_t myTool =
            "Motorola PowerQUICC (MPC8XX) Inverse Assembler-1";
      AgtLA::IToolPtr pTool = pInst->GetToolByName(myTool);
      BSTR cmdResponseXML;
      if (pTool->QueryCommand("GetProperties", &cmdResponseXML)) {
         printf("MPC8XX IA Properties '%S'\n",
               (char*) cmdResponseXML);
      }
      SysFreeString(cmdResponseXML);
   }
   catch (_com_error& e) {
      DisplayError(e);
   }

   // Uninitialize the Microsoft COM/ActiveX library.
   CoUninitialize();
}
else
{
   printf("CoInitialize failed\n");
}

return 0;
}
```

```
////////////////////////////////////////////////////////////////////
//
//  Displays the last error -- used to show the last exception
//  information.
//
void DisplayError(_com_error& error)
{
   printf("*** DisplayError()\n");

   printf("Fatal Unexpected Error:\n");
   printf("  Error Number = %08lx\n", error.Error());

   static char errorStr[1024];
   _bstr_t desc = error.Description();

   if (desc.length() == 0)
   {
      // Don't have a description string.
      strcpy(errorStr, error.ErrorMessage());
      int nLen = lstrlen(errorStr);

      // Remove funny carriage return ctrl<M>.
      if (nLen > 2 && (errorStr[nLen - 2] == 0xd))
      {
         errorStr[nLen - 2] = '\0';
      }
   }
   else
   {
      strcpy(errorStr, desc);
   }

   printf("  Error Message = %s\n", (char*) errorStr);
}
```

VbaViewChart Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

To Access

- VbaViewWindow.Chart (see page 214)

Description

The VbaViewChart object represents a chart in the VbaViewWindow.

Methods

Method	Description
Draw (see page 151)	Draws the chart.

Properties

Property	Description
Axis (see page 208)	Gets the chart axis given an axis type.
ChartType (see page 214)	Gets or sets the chart type.
Data (see page 219)	Gets the chart data.

Property	Description
HasLegend (see page 223)	Gets or sets if the legend is visible.
HasTitle (see page 223)	Gets or sets if the title is visible.
Legend (see page 225)	Gets the chart legend.
Title (see page 240)	Gets the title of the chart.

See Also

- Chart (see page 214) property

VbaViewChartAxis Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

To Access

- VbaViewChart.Axis (see page 208)

Description

The VbaViewChartAxis object represents a chart in the VbaViewWindow.

Methods

There are no methods.

Properties

Property	Description
AxisBase (see page 208)	Gets or sets the chart axis base.
BitSize (see page 210)	Gets or sets the width of the data in bits. This is used to format the Axis values.
HasTitle (see page 223)	Gets or sets if the title is visible.
Title (see page 240)	Gets the title of the axis.

See Also

- Axis (see page 208) property

VbaViewChartData Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

To Access

- VbaViewChart.Data (see page 219)

Description

The VbaViewChartData object represents the data in a VbaViewChart.

Methods

Method	Description
AddPointArrays (see page 144)	Adds an array of points to the chart. This is only valid for chart types AgtChartTypeLine and AgtChartTypeXYScatter.
Clear (see page 145)	Clears all of the chart data.
GetGroupCaption (see page 162)	Gets the caption associated with a group (row).
GetValueCaption (see page 173)	Gets the caption associated with all values at index (column).
SetGroupCaption (see page 194)	Sets the caption associated with a group (row).
SetValue (see page 195)	Sets an individual value in the chart array.
SetValueArray (see page 195)	Sets an array of values in the chart array starting at index 0.
SetValueCaption (see page 196)	Sets the caption associated with all values at index (column).

Properties There are no properties.

See Also
- Data (see page 219) property

VbaViewChartFont Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

To Access
- VbaViewChartTitle.Font (see page 222)

Description The VbaViewChartFont object represents the font of a VbaViewChartTitle.

Methods There are no methods.

Properties

Property	Description
Bold (see page 210)	Gets or sets the text thickness.
Color (see page 215)	Gets or sets the text color.
FaceName (see page 222)	Gets or sets the text face name string.
Size (see page 235)	Gets or sets the text size.

See Also
- Font (see page 222) property

VbaViewChartLegend Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

To Access
- VbaViewChart.Legend (see page 225)

Description The VbaViewChartLegend object represents the legend in a VbaViewChart.

Methods There are no methods.

Properties

Property	Description
Position (see page 230)	Gets or sets the chart legend position.

See Also
- Legend (see page 225) property

VbaViewChartTitle Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

To Access
- VbaViewChart.Title (see page 240)

Description The VbaViewChartTitle object represents the title of a VbaViewChart.

Methods There are no methods.

Properties

Property	Description
Caption (see page 213)	Gets or sets the chart title caption.
Font (see page 222)	Gets the chart title font.

See Also

- Title (see page 240) property

VbaViewWebBrowser Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 135)]

To Access

- VbaViewWindow.WebBrowser (see page 243)

Description

The VbaViewWebBrowser object represents a web browser in the VbaViewWindow.

Methods

Method	Description
Clear (see page 145)	Displays an empty web page.

Properties

Property	Description
WebBrowser (see page 243)	Gets the contained IWebBrowser2 interface.

Requirements

- Version (see page 42): 3.20 or later.

See Also

- WebBrowser (see page 243) property

VbaViewWebBrowser Example

```
Dim browser As SHDocVw.WebBrowser   ' "Microsoft Internet Controls"
                                    ' reference.
Set browser = myVbaViewWindow.WebBrowser.WebBrowser

' Display the Keysight home page.
browser.Navigate ("http://www.keysight.com")

' You can optionally wait until the page is completely loaded.
While browser.readyState <> READYSTATE_COMPLETE
  DoEvents
Wend
```

VbaViewWindow Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

To Access

-

```
Dim variable As AgtLA.VbaViewWindow
Set variable = Window (see page 136)
```

Description

The VbaViewWindow object represents an output window for Visual Basic for Applications (VBA) programs.

Methods

Method	Description
ClearOutput (see page 145)	Clears the strings from the output window.
WriteOutput (see page 205)	Writes a string to the output window.

(Also Includes Window (see page 136) methods)

Properties

Property	Description
Chart (see page 214)	Gets the Chart view.
WebBrowser (see page 243)	Gets the Web Browser view.

(Also Includes Window (see page 136) properties)

VbaViewWindow Examples

For instructions on setting up VbaView window programs, see "Displaying Data in VbaView Windows" (in the online help).

Window Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 137)]

To Access

- Instrument.GetWindowByName(Name) (see page 174)
- Windows.Item (see page 224) IndexOrName
- Windows IndexOrName

Methods

Method	Description
DoAction (see page 147)	Execute a specific XML-based command action.
DoCommands (see page 147)	Execute a particular XML-based command.
Find (see page 154)	Finds a specified data event with optional occurrence and time duration.
FindNext (see page 158)	Finds the next event by searching forward from the last event found using the event specified by the last call to Find (see page 154).
FindPrev (see page 159)	Finds the previous event by searching backward from the last event found using the event specified by the last call to Find (see page 154).
GoToPosition (see page 179)	Moves the center of the window to a new position.
QueryCommand (see page 186)	Query for XML-based commands.

Properties

Property	Description
BusSignals (see page 212)	Gets a collection of the window's defined bus/signals.
Name (see page 227)	Gets or sets the name of the window.
Type (see page 241)	Gets the window's type.

See Also

- Windows (see page 137) object

Windows Object

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 137)]

To Access

- Instrument.Windows (see page 244)

Methods

There are no methods.

Properties

Property	Description
_NewEnum (see page 244)	Used by Visual Basic to support the implementation of **For Each ... Next**.
Count (see page 216)	Gets the number of windows in the collection.
Item (see page 224)	Gets one of the windows in the collection given either an index or name.

See Also

- Windows (see page 244) property
- Window (see page 136) object
- GetWindowByName (see page 174) method

Windows Example

Visual Basic

```
' When using Visual Basic outside of the Keysight Logic Analyzer
' application, you must create the Connect object (see
page 95) and use it
' to access the Instrument object.  In this example, "myInst"
' represents the Instrument object.
'
' When "using the Advanced Customization Environment (ACE)" (in the
online help),
' the Instrument object is already created and is globally
' accessible using "AgtLA".  In this example, substitute "myInst"
' with "AgtLA" to access the global Instrument object in VBA.

' Display all of the window names.
Dim myWindowNames As String
Dim myWindow As AgtLA.Window

For Each myWindow in myInst.Windows
   ' Add the window's name to the string.
   myWindowNames = myWindowNames + vbNewLine + myWindow.Name
Next
MsgBox "Window names: " + myWindowNames

' Get the compare window using the Windows default
' Item method, then execute the compare.
myInst.Windows("Compare-1").Execute
```

Visual C++

```
//
//  This simple Visual C++ Console application demonstrates how to
//  use the Keysight 168x/169x/169xx COM interface to display all the
//  window names and to perform an execute in the Compare window.
//
//  This project was created in Visual C++ Developer.  To create a
//  similar project:
//
//    - Execute File -> New
```

```
//    - Select the Projects tab
//    - Select "Win32 Console Application"
//    - Select A "hello,World!" application (Visual Studio 6.0)
//
//  To make this buildable, you need to specify your "import" path
//  in stdafx.h (search for "TODO" in that file).  For example, add:
//  #import "C:/Program Files/Keysight Technologies/Logic Analyzer/LA \
//  COM Automation/agClientSvr.dll"
//
//  To run, you need to specify the host logic analyzer to connect
//  to (search for "TODO" below).
//

#include "stdafx.h"


////////////////////////////////////////////////////////////////////////
//
//  Forward declarations.
//
void DisplayError(_com_error& err);


////////////////////////////////////////////////////////////////////////
//
//  main() entry point.
//
int main(int argc, char* argv[])
{
   printf("*** Main()\n");

   //
   //  Initialize the Microsoft COM/ActiveX library.
   //
   HRESULT hr = CoInitialize(0);

   if (SUCCEEDED(hr))
   {
      try {   // Catch any unexpected run-time errors.
         _bstr_t hostname = "mtx33";   // TODO, use your logic
                                       // analysis system hostname.
         printf("Connecting to instrument '%s'\n", (char*) hostname);

         // Create the connect object and get the instrument object.
         AgtLA::IConnectPtr pConnect =
               AgtLA::IConnectPtr(__uuidof(AgtLA::Connect));
         AgtLA::IInstrumentPtr pInst =
               pConnect->GetInstrument(hostname);

         // Load the configuration file.
         _bstr_t configFile = "C:\\LA\\Configs\\compare.ala";
         printf("Loading the config file '%s'\n", (char*) configFile);
         pInst->Open(configFile, FALSE, "", TRUE);

         // Display all of the window names.
         AgtLA::IWindowsPtr pWindows = pInst->GetWindows();
         for (long i = 0; i < pWindows->GetCount(); i++)
```

```
            {
               AgtLA::IWindowPtr pWindow = pWindows->GetItem(i);
               _bstr_t name = pWindow->GetName();
               printf("Window name = %s\n", (char*) name);
            }

            // Get the Compare window, then execute the compare.
            AgtLA::ICompareWindowPtr pCompareWindow =
                  pInst->GetWindowByName("Compare-1");
            _bstr_t myCompareOptions = "<Options ReferenceOffset='-2' \
                  Range='M1..M2' MaxDifferences='0'/>";
            pCompareWindow->PutOptions(myCompareOptions);
            pCompareWindow->Execute();
            printf("Compare executed using options '%s'\n",
                  (char*) myCompareOptions);
         }
         catch (_com_error& e) {
            DisplayError(e);
         }

         // Uninitialize the Microsoft COM/ActiveX library.
         CoUninitialize();
      }
      else
      {
         printf("CoInitialize failed\n");
      }

      return 0;
   }


   ////////////////////////////////////////////////////////////////////////
   //
   //  Displays the last error -- used to show the last exception
   //  information.
   //
   void DisplayError(_com_error& error)
   {
      printf("*** DisplayError()\n");

      printf("Fatal Unexpected Error:\n");
      printf("  Error Number = %08lx\n", error.Error());

      static char errorStr[1024];
      _bstr_t desc = error.Description();

      if (desc.length() == 0)
      {
         // Don't have a description string.
         strcpy(errorStr, error.ErrorMessage());
         int nLen = lstrlen(errorStr);

         // Remove funny carriage return ctrl<M>.
         if (nLen > 2 && (errorStr[nLen - 2] == 0xd))
         {
            errorStr[nLen - 2] = '\0';
```

```
            }
        }
        else
        {
            strcpy(errorStr, desc);
        }

        printf("  Error Message = %s\n", (char*) errorStr);
    }
```

Methods

- ImportEx Method (see page 180)
- InsertLine Method (see page 181)
- IsOnline Method (see page 181)
- IsTimingZoom Method (see page 181)
- New Method (see page 182)
- Open Method (see page 182)
- PanelLock Method (see page 183)
- PanelUnlock Method (see page 186)
- QueryCommand Method (see page 186)
- RecallTriggerByFile Method (see page 188)
- RecallTriggerByName Method (see page 189)
- RecvFile Method (see page 189)
- Remove Method (BusSignals Object) (see page 190)
- Remove Method (Markers Object) (see page 190)
- RemoveAll Method (see page 190)
- RemoveXML Method (see page 190)
- RemoveLine Method (see page 191)
- Reset Method (see page 191)
- Resume Method (see page 192)
- Run Method (Instrument Object) (see page 192)
- Run Method (PattgenModule Object) (see page 192)
- Save Method (see page 193)
- SendFile Method (see page 193)
- SetGroupCaption Method (see page 194)
- SetLine Method (see page 194)
- SetLineLabel Method (see page 194)
- SetValue Method (see page 195)
- SetValueArray Method (see page 195)
- SetValueCaption Method (see page 196)
- SimpleTrigger Method (see page 196)
- Step Method (see page 198)
- Stop Method (Instrument Object) (see page 198)
- Stop Method (PattgenModule Object) (see page 199)
- TestAll Method (see page 199)
- VBADisplayHelpTopic Method (see page 200)
- VBARunMacro Method (see page 200)
- WaitComplete Method (see page 200)
- WriteOutput Method (see page 205)
- WriteProtocolDataFieldsToFile Method (see page 204)

Add Method (BusSignals Object)

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- BusSignals (see page 90) object

Description Adds a BusSignal (see page 85) object to the BusSignals (see page 90) collection using specific values.

VB Syntax object.Add Name, Channels, [Polarity="+"]

Parameters	Definition
object	An expression that evaluates to a **BusSignals (see** page 90) object.
Name	A **String** containing the name of the bus/signal to be added.
Channels	A **String** containing *MultiplePodChannels* or the **String** "*None*" if no channels are assigned. **MultiplePodChannels** contains a comma separated list of *PodChannels*. **PodChannels** contains a *PodNumber* followed by the **String** "*[*" followed by a comma separated list of individual channel *Number(s)* and *NumberRange(s)* followed by the **String** "*]*". ***Note:****Pod channels normally are in MSB to LSB notation unless you are trying to reorder channels.* **NumberRange** contains a *Number* followed by the **String** "**:**" followed by a *Number*. PodChannels Example: `Pod 1[9:7,5,3:1]` – this bus consists of 1 single channel *Number* and 2 *NumberRange's* for a total of 7 channels. They are Pod 1[9], Pod 1[8], Pod 1[7], Pod 1[5], Pod 1[3], Pod 1[2], Pod 1[1]. MultiplePodChannels Example: `Pod 2[3,1],Pod 3[10,5:3]` – this bus consists of 3 single channel *Numbers* and 1 *NumberRange* for a total of 6 channels Pod 2[3], Pod 2[1], Pod 3[10], Pod 3[5], Pod 3[4], Pod 3[3].
Polarity	A **String** that is either "+" or "-". This parameter is optional and is "+" if not specified.

Add Method (Markers Object)

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 101)]

Applies To

- Markers (see page 100) object

Description Adds a Marker (see page 100) object to the Markers (see page 100) collection using specific values.

VB Syntax object.Add Name, TextColor, BackgroundColor, Position

Parameters	Definition
object	An expression that evaluates to a **Markers (see** page 100) object.
Name	A **String** containing the name of the marker to be added.
TextColor	A **Long** representing the color of the text.
BackgroundColor	A **Long** representing the color of the background.
Position	A **Double** that specifies the position of the marker (in seconds) relative to the trigger.

AddXML Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 101)]

Applies To

- Markers (see page 100) object

Description Adds multiple Marker (see page 100) objects to the Markers (see page 100) collection using an XML string.

VB Syntax object.AddXML XMLMarkers

Parameters	Definition
object	An expression that evaluates to a **Markers (see** page 100) object.
XMLMarkers	An "XML format" (in the online help)**String** containing the markers to add (see "<Markers> element" (in the online help)).

AddPointArrays Method

[Automation Home (see page 3)] [Objects (see page 83)]

Applies To

- VbaViewChartData (see page 133) object

Description Adds an array of points to the chart. This is only valid for chart types AgtChartTypeLine and AgtChartTypeXYScatter.

VB Syntax object.AddPointArrays XValueArray, YValueArray, [PointType=AgtDataPointTypeAutomatic], [PointSize=AgtDataPointSizeSmall]

Parameters	Definition
object	An expression that evaluates to a VbaViewChartData (see page 133) object.
XValueArray	An array of **Variant**s that are the X values to set in the chart.
YValueArray	An array of **Variant**s that are the Y values to set in the chart.
PointType	An **AgtDataPointType** enumerated type value that specifies the shape of the point. See the descriptions below.
PointSize	An **AgtDataPointSize** enumerated type value that specifies the size of the point. See the descriptions below.

Remarks The PointType parameter can have the following values:

AgtDataPointType	Enum Value	Description
AgtDataPointTypeNone	1	
AgtDataPointTypeAutomatic	2	
AgtDataPointTypeSquare	3	
AgtDataPointTypeDiamond	4	
AgtDataPointTypeTriangle	5	
AgtDataPointTypeInvertTriangle	6	
AgtDataPointTypeStar	7	
AgtDataPointTypeCircle	8	

The PointSize parameter can have the following values:

AgtDataPointSize	Enum Value	Description
AgtDataPointSizeSmall	1	
AgtDataPointSizeMedium	2	
AgtDataPointSizeLarge	3	

Clear Method (for VbaViewChartData object)

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

Applies To

- VbaViewChartData (see page 133) object

Description

Clears all of the chart data.

VB Syntax

object.Clear

Parameters	Definition
object	An expression that evaluates to a VbaViewChartData (see page 133) object.

Clear Method (for VbaViewWebBrowser object)

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

Applies To

- VbaViewWebBrowser (see page 135) object

Description

Displays an empty web page.

VB Syntax

object.Clear

Parameters	Definition
object	An expression that evaluates to a VbaViewWebBrowser (see page 135) object.

Requirements

- Version (see page 42): 3.20 or later.

ClearOutput Method

[Automation Home (see page 3)] [Objects (see page 83)]

Applies To

- VbaViewWindow (see page 135) object

Description

Clears the strings from the output window.

VB Syntax

object.ClearOutput

Parameters	Definition
object	An expression that evaluates to a VbaViewWindow (see page 135) object.

Close Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To
- Instrument (see page 98) object

Description Closes the current configuration.

VB Syntax object.Close [SaveChanges=False] [SaveFileName=""] [SetupOnly=False]

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.
SaveChanges	A **Boolean** that specifies whether changes to the configuration should be saved.
SaveFileName	A **String** that is the name of the file to which the configuration information should be saved.
SetupOnly	A **Boolean** that specifies whether the configuration file contains captured data or just setup information: **True** – save only setup information. **False** – save data and setup information.

Connect Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To
- ConnectSystem (see page 95) object

Description Connects to the remote logic analyzer system.

VB Syntax object.Connect [HostNameOrIpAddress=""]

Parameters	Definition
object	An expression that evaluates to a ConnectSystem (see page 95) object.
HostNameOrIpAddress	A **String** that contains the hostname or IP address of the logic analyzer instrument or computer on which the *Keysight Logic Analyzer* application will run. This parameter is optional.

See Also
- RecvFile (see page 189) method
- SendFile (see page 193) method

CopyFile Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To
- Connect (see page 95) object

Description Copies a file to the instrument file system.

The Instrument (see page 224) property must be called first to establish a connection to the logic analyzer to which the file will be copied.

VB Syntax object.CopyFile SrcFileName, DestFileName

Parameters	Definition
object	An expression that evaluates to a Connect (see page 95) object.
SrcFileName	A **String** that is the name of the file on the local file system.
DestFileName	A **String** that is the name of the file on the instrument file system.

See Also
- Instrument (see page 224) property

DeleteFile Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To
- Instrument (see page 98) object

Description Deletes a file on the instrument file system.

VB Syntax object.DeleteFile FileName

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.
FileName	A **String** that is the name of the file on the instrument file system.

DoAction Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To
- Instrument (see page 98) object
- Module (see page 105) object
- Probe (see page 111) object
- Tool (see page 128) object
- Window (see page 136) object

Description Executes a specific command action.

VB Syntax object.DoAction Action, Parameters

Parameters	Definition
object	An expression that evaluates to one of the objects in the "Applies to" list above.
Action	Name of the command to execute. For information about the XML-based actions supported by a tool, see the "Tool Control, COM Automation" topic in the tool's online help.
Parameters	Command parameters.

Return Value A Boolean indicating whether the command was successful.

DoCommands Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 148)]

Applies To
- Instrument (see page 98) object
- Module (see page 105) object
- Probe (see page 111) object
- Tool (see page 128) object
- Window (see page 136) object

Description Executes a particular XML-based command.

VB Syntax object.DoCommands XMLCommand

Parameters	Definition
object	An expression that evaluates to one of the objects in the "Applies to" list above.
XMLCommand	An XML-format string that configures a module, tool, or window. See "Remarks" below.

Return Value A Boolean indicating whether the command was successful.

Remarks The XMLCommand format is based on the object type:

Object	XMLCommand Format
Instrument (see page 98)	A string containing the XML format "<Configuration> element" (in the online help).
Module (see page 105)	A string containing the XML format "<Module> element" (in the online help) (under Configuration Setup).
Probe (see page 111)	A string containing the XML format "<Probe> element" (in the online help) (under Configuration Setup).
Tool (see page 128)	A string containing the XML format "<Tool> element" (in the online help) (under Configuration Setup).
Window (see page 136)	A string containing the XML format "<Window> element" (in the online help) (under Configuration Setup).

DoCommands Example

Visual Basic

```
' When using Visual Basic outside of the Keysight Logic Analyzer
' application, you must create the Connect object (see
page 95) and use it
' to access the Instrument object.  In this example, "myInst"
' represents the Instrument object.
'
' When "using the Advanced Customization Environment (ACE)" (in the
online help),
' the Instrument object is already created and is globally
' accessible using "AgtLA".  In this example, substitute "myInst"
' with "AgtLA" to access the global Instrument object in VBA.

' Get the MPC8XX Inverse Assembler tool.
Dim myTool As AgtLA.Tool
Set myTool = myInst.GetToolByName("Motorola PowerQUICC (MPC8XX) " + _
      "Inverse Assembler-1")

' Query for XML-based command.
Dim XMLCommand As String
If myTool.QueryCommand("GetProperties", XMLCommand) Then
   MsgBox "MPC8XX IA Properties: " + XMLCommand
End If

' Execute XML-based command.
If myTool.DoCommands(XMLCommand) Then
   MsgBox "MPC8XX IA DoCommands successful."
End If
```

Visual C++

```
//
//  This simple Visual C++ Console application demonstrates how to use
//  the Keysight 168x/169x/169xx COM interface to execute XML based
//  commands.
//
//  This project was created in Visual C++ Developer.  To create a
//  similar project:
//
//    - Execute File -> New
//    - Select the Projects tab
//    - Select "Win32 Console Application"
//    - Select A "hello,World!" application (Visual Studio 6.0)
//
//  To make this buildable, you need to specify your "import" path
//  in stdafx.h (search for "TODO" in that file).  For example, add:
//  #import "C:/Program Files/Keysight Technologies/Logic Analyzer/LA \
//  COM Automation/agClientSvr.dll"
//
//  To run, you need to specify the host logic analyzer to connect
//  to (search for "TODO" below).
//

#include "stdafx.h"


////////////////////////////////////////////////////////////////////////
//
//  Forward declarations.
//
void DisplayError(_com_error& err);


////////////////////////////////////////////////////////////////////////
//
//  main() entry point.
//
int main(int argc, char* argv[])
{
   printf("*** Main()\n");

   //
   //  Initialize the Microsoft COM/ActiveX library.
   //
   HRESULT hr = CoInitialize(0);

   if (SUCCEEDED(hr))
   {
      try {   // Catch any unexpected run-time errors.
         _bstr_t hostname = "mtx33";   // TODO, use your logic
                                       // analysis system hostname.
         printf("Connecting to instrument '%s'\n", (char*) hostname);

         // Create the connect object and get the instrument object.
         AgtLA::IConnectPtr pConnect =
               AgtLA::IConnectPtr(__uuidof(AgtLA::Connect));
         AgtLA::IInstrumentPtr pInst =
               pConnect->GetInstrument(hostname);
```

```
            // Load the configuration file.
            _bstr_t configFile = "C:\\LA\\Configs\\config.ala";
            printf("Loading the config file '%s'\n", (char*) configFile);
            pInst->Open(configFile, FALSE, "", TRUE);

            // Run the measurement, wait for it to complete.
            pInst->Run(FALSE);
            pInst->WaitComplete(20);

            // Get the MPC8XX Inverse Assembler tool.
            _bstr_t myTool =
                  "Motorola PowerQUICC (MPC8XX) Inverse Assembler-1";
            AgtLA::IToolPtr pTool = pInst->GetToolByName(myTool);

            // Query for XML-based command.
            BSTR commandXML;
            if (pTool->QueryCommand("GetProperties", &commandXML)) {
               printf("MPC8XX IA Properties '%S'\n", (char*) commandXML);
            }

            // Execute XML based command.
            if (pTool->DoCommands((_bstr_t) commandXML)) {
               printf("MPC8XX IA DoCommands successful.\n");
            }

            SysFreeString(commandXML);
         }
         catch (_com_error& e) {
            DisplayError(e);
         }

         // Uninitialize the Microsoft COM/ActiveX library.
         CoUninitialize();
      }
      else
      {
         printf("CoInitialize failed\n");
      }

      return 0;
   }


   ////////////////////////////////////////////////////////////////////
   //
   //  Displays the last error -- used to show the last exception
   //  information.
   //
   void DisplayError(_com_error& error)
   {
      printf("*** DisplayError()\n");

      printf("Fatal Unexpected Error:\n");
      printf("  Error Number = %08lx\n", error.Error());

      static char errorStr[1024];
```

```
    _bstr_t desc = error.Description();

    if (desc.length() == 0)
    {
       // Don't have a description string.
       strcpy(errorStr, error.ErrorMessage());
       int nLen = lstrlen(errorStr);

       // Remove funny carriage return ctrl<M>.
       if (nLen > 2 && (errorStr[nLen - 2] == 0xd))
       {
          errorStr[nLen - 2] = '\0';
       }
    }
    else
    {
       strcpy(errorStr, desc);
    }

    printf("  Error Message = %s\n", (char*) errorStr);
}
```

Draw Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

Applies To

- VbaViewChart (see page 132) object

Description

Draws the chart.

VB Syntax

object.Draw

Parameters	Definition
object	An expression that evaluates to a VbaViewChart (see page 132) object.

Execute Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 87)]

Applies To

- CompareWindow (see page 95) object

Description

Executes the compare using the current options.

VB Syntax

object.Execute

Parameters	Definition
object	An expression that evaluates to a CompareWindow (see page 95) object.

See Also

- Differences (see page 221) property
- SampleDifferences (see page 233) property

Export Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Instrument (see page 98) object

Description

Exports data to a file on the instrument file system.

VB Syntax

object.Export ExportFileName SourceName [ExportRange=False] [StartRange] [EndRange]

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.
ExportFileName	A **String** that contains the name of the file (on the instrument file system) to which data is exported.
SourceName	A **String** that contains the name of the Module, Tool, or Window whose data will be exported.
ExportRange	A **Boolean** that specifies whether a data range is used: **True** – StartRange and EndRange contain the data range to export. **False** – exports all the data.
StartRange EndRange	**Variant**s specifying the data range (see page 152).

Remarks

The file is stored onto a drive that is directly accessible by the instrument.

The file format is determined by the ExportFileName suffix. File names with the .csv suffix are either "Standard CSV text file" format or "Pattern Generator CSV text file" format, depending on the SourceName. File names with the .alb suffix are "Module binary file" format (and the SourceName must be a logic analyzer or import module).

The Export method does not support the "Module CSV text file" format. To export this file type, use the ExportEx (see page 152) method.

See Also

- ExportEx (see page 152) method
- Import (see page 179) method
- ImportEx (see page 180) method

Data Ranges

Data ranges are specified by Variant start and end parameters.

For:	Use the Variant Type:
sample numbers	**Integer** or **Long**
times	**Double**

In other words:

- To specify a range by sample numbers, use Integer or Long start and end parameters.
- To specify a range by time, use Double start and end parameters.

See Also

- Export (see page 151) method
- GetNumSamples (see page 168) method
- GetTime (see page 172) method

ExportEx Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Instrument (see page 98) object

Description

Exports data to a file on the instrument file system.

VB Syntax

object.ExportEx ExportFileName SourceName [ExportRange=False] [StartRange] [EndRange] [FileType=""] [FileOptions=""]

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.
ExportFileName	A **String** that contains the name of the file (on the instrument file system) to which data is exported.
SourceName	A **String** that contains the name of the Module, Tool, or Window whose data will be exported. When the "Module CSV text file" or "Module binary file" FileType is specified, the SourceName must be a logic analyzer or import module. Timing zoom data can be exported separately using the SourceName syntax of "<module_name>:TimingZoom", for example, "My 16950A-1:TimingZoom". When the "Pattern Generator CSV text file" FileType is specified, the SourceName must be a pattern generator module.
ExportRange	A **Boolean** that specifies whether a data range is used: **True** – StartRange and EndRange contain the data range to export. **False** – exports all the data.
StartRange EndRange	**Variant**s specifying the data range (see page 152).
FileType	A **String** that identifies the type of data you want to export. This is the same string that you see in the *Keysight Logic Analyzer* application's Export dialog: ▪ "Standard CSV text file" ▪ "Module CSV text file" ▪ "Module binary file" ▪ "Pattern Generator CSV text file"

FileOptions	An XML format **String** that lets you specify export options (as you can with the *Keysight Logic Analyzer* application's Export dialog **Options...** button). For example:
	`<Options`
	`SeparationCharacters=','`
	`WriteLineNumberColumn='T'`
	`LineNumberColumnName='Line Number'`
	`IncludeHeader='T'`
	`WriteFixedWidthColumns='F'`
	`/>`
	The `<Options>` element attribute values can be:
	▪ `SeparationCharacters='string'`
	▪ `WriteLineNumberColumn='F'` (false) or `'T'` (true)
	▪ `LineNumberColumnName='string'`
	▪ `IncludeHeader='F'` (false) or `'T'` (true)
	▪ `WriteFixedWidthColumns='F'` (false) or `'T'` (true)
	Certain file types support certain file options (as in the *Keysight Logic Analyzer* application):
	▪ "Standard CSV text file" – `SeparationCharacters`, `WriteLineNumberColumns`, and `LineNumberColumnName`.
	▪ "Module CSV text file" – `SeparationCharacters`, `WriteLineNumberColumns`, `LineNumberColumnName`, and `IncludeHeader`.
	▪ "Module binary file" – `IncludeHeader`.
	▪ "Pattern Generator CSV text file" – `SeparationCharacters`.

Remarks

The file is stored onto a drive that is directly accessible by the instrument.

See Also

- Export (see page 151) method
- Import (see page 179) method
- ImportEx (see page 180) method

Find Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 155)]

Applies To

- Window (see page 136) object

Description

Finds a specified data event with optional occurrence and time duration.

VB Syntax

object.Find Event, [Occurrence=1], [Direction="F"], [From="Display Center"], [When="Present"], [Duration=""]

Parameters	Definition
object	An expression that evaluates to a Window (see page 136) object.
Event	A **String** containing the event to find. The event can be a simple string (see Event (see page 196)) or, for more complex searches, an XML format string (see "<Event> element (under Find)" (in the online help)).
Occurrence	A **Long** containing the number of occurrences of the Event parameter.
Direction	A **String** containing the direction to search. "F" searches forward, "B" searches backward.

Parameters	Definition
From	A **String** containing the position to start searching. This can be any of the following: ▪ "Display Center" ▪ "Beginning Of Data" ▪ "End Of Data" ▪ "Trigger" ▪ Name of a currently defined marker. Note that these strings are case-sensitive.
When	A **String** specifying a time duration or other operator. ▪ "Present" ▪ "Not Present" ▪ "Present>" (Duration must contain only one time value) ▪ "Present>=" (Duration must contain only one time value) ▪ "Present<" (Duration must contain only one time value) ▪ "Present<=" (Duration must contain only one time value) ▪ "Present for Range" (Duration must contain a time range) ▪ "Not In Range" (Duration must contain a time range) ▪ "Entering" ▪ "Exiting" ▪ "Transitioning" Note that these strings are case-sensitive.
Duration	A **String** containing a time duration which is only valid for certain 'When' qualifiers above. The format of this string can be either a time value or time range value. A time range contains a time value followed by the string ".." followed by another time value. A time value contains a number followed by a time unit. A time unit can be any of the strings: ▪ "ps" - picoseconds ▪ "ns" - nanoseconds ▪ "us" - microseconds ▪ "ms" - milliseconds ▪ "s" - seconds ▪ "Gs" - gigaseconds Examples: ▪ "1 ps" ▪ "1ns..30ns"

Return Value

A FindResult (see page 97) object containing the results of the find.

See Also

- FindNext (see page 158) method
- FindPrev (see page 159) method
- FindResult (see page 97) object

Find Example

Visual Basic

```
Dim myWindow As Window
Set myWindow = myInst.Windows("Listing-1")

' Find using a simple event.
Dim myResult As FindResult
Set myResult = myWindow.Find("My Bus 1 = h55", 1, "F", _
    "Beginning Of Data")
If myResult.Found Then
  ' The event was found...
End If

' Find the same event using XML.
Dim myXMLEvent As String
myXMLEvent = "<Event>" + _
```

```
                "<BusSignal Name='My Bus 1' Operator='=' " + _
                      "Value='h55' />" + _
            "</Event>"
Set myResult = myWindow.Find(myXMLEvent, 1, "F", "Beginning Of Data")
If myResult.Found Then
  ' The event was found...
End If
```

Visual C++

```
//
//  This simple Visual C++ Console application demonstrates how to use
//  the Keysight 168x/169x/169xx COM interface to find a specified data
//  event.
//
//  This project was created in Visual C++ Developer.  To create a
//  similar project:
//
//    - Execute File -> New
//    - Select the Projects tab
//    - Select "Win32 Console Application"
//    - Select A "hello,World!" application (Visual Studio 6.0)
//
//  To make this buildable, you need to specify your "import" path
//  in stdafx.h (search for "TODO" in that file).  For example, add:
//  #import "C:/Program Files/Keysight Technologies/Logic Analyzer/LA \
//  COM Automation/agClientSvr.dll"
//
//  To run, you need to specify the host logic analyzer to connect
//  to (search for "TODO" below).
//

#include "stdafx.h"


////////////////////////////////////////////////////////////////////////
//
//  Forward declarations.
//
void DisplayError(_com_error& err);


////////////////////////////////////////////////////////////////////////
//
//  main() entry point.
//
int main(int argc, char* argv[])
{
   printf("*** Main()\n");

   //
   //  Initialize the Microsoft COM/ActiveX library.
   //
   HRESULT hr = CoInitialize(0);

   if (SUCCEEDED(hr))
   {
      try {   // Catch any unexpected run-time errors.
         _bstr_t hostname = "mtx33";   // TODO, use your logic
```

```
                                        // analysis system hostname.
      printf("Connecting to instrument '%s'\n", (char*) hostname);

      // Create the connect object and get the instrument object.
      AgtLA::IConnectPtr pConnect =
            AgtLA::IConnectPtr(__uuidof(AgtLA::Connect));
      AgtLA::IInstrumentPtr pInst =
            pConnect->GetInstrument(hostname);

      // Run the measurement, wait for it to complete.
      pInst->Run(FALSE);
      pInst->WaitComplete(20);

      // Get a specific window.
      _bstr_t myListing = "Listing-1";
      AgtLA::IWindowPtr pWindow = pInst->GetWindowByName(myListing);

      // Find using a simple event.
      _bstr_t myEvent = "My Bus 1 = h55";
      AgtLA::IFindResultPtr pFindResult = pWindow->Find(myEvent, 1,
            "F", "Beginning Of Data", "Present", "");
      if (pFindResult->GetFound()) {
         _bstr_t myTimeFound = pFindResult->GetTimeFoundString();
         printf("Event '%s' was found at '%s'.\n", (char*) myEvent,
               (char *) myTimeFound);
      }
      else {
         printf("Event '%s' was not found.\n", (char*) myEvent);
      }

      // Find the same event using XML.
      _bstr_t myXMLEvent = "<Event><BusSignal Name='My Bus 1' \
            Operator='=' Value='h55' /></Event>";
      pFindResult = pWindow->Find(myXMLEvent, 1, "F", \
            "Beginning Of Data", "Present", "");
      if (pFindResult->GetFound()) {
         _bstr_t myTimeFound = pFindResult->GetTimeFoundString();
         printf("XML event '%s' was found at '%s'.\n",
               (char*) myXMLEvent, (char *) myTimeFound);
      }
      else {
         printf("XML event '%s' was not found.\n",
               (char*) myXMLEvent);
      }
   }
   catch (_com_error& e) {
      DisplayError(e);
   }

   // Uninitialize the Microsoft COM/ActiveX library.
   CoUninitialize();
}
else
{
   printf("CoInitialize failed\n");
}
```

```
   return 0;
}


////////////////////////////////////////////////////////////////////
//
//  Displays the last error -- used to show the last exception
//  information.
//
void DisplayError(_com_error& error)
{
   printf("*** DisplayError()\n");

   printf("Fatal Unexpected Error:\n");
   printf("  Error Number = %08lx\n", error.Error());

   static char errorStr[1024];
   _bstr_t desc = error.Description();

   if (desc.length() == 0)
   {
      // Don't have a description string.
      strcpy(errorStr, error.ErrorMessage());
      int nLen = lstrlen(errorStr);

      // Remove funny carriage return ctrl<M>.
      if (nLen > 2 && (errorStr[nLen - 2] == 0xd))
      {
         errorStr[nLen - 2] = '\0';
      }
   }
   else
   {
      strcpy(errorStr, desc);
   }

   printf("  Error Message = %s\n", (char*) errorStr);
}
```

FindNext Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 155)]

Applies To

- Window (see page 136) object

Description

Finds the next event by searching forward from the last event found using the event specified by the last call to Find (see page 154).

VB Syntax

object.FindNext

Parameters	Definition
object	An expression that evaluates to a Window (see page 136) object.

Return Value

A FindResult (see page 97) object containing the results of the find.

See Also

- FindResult (see page 97) object
- Find (see page 154) method
- FindPrev (see page 159) method

FindPrev Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 155)]

Applies To

- Window (see page 136) object

Description

Finds the previous event by searching backward from the last event found using the event specified by the last call to Find (see page 154).

VB Syntax

object.FindPrev

Parameters	Definition
object	An expression that evaluates to a Window (see page 136) object.

Return Value

A FindResult (see page 97) object containing the results of the find.

See Also

- FindResult (see page 97) object
- Find (see page 154) method
- FindNext (see page 158) method

GetDataBySample Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 115)]

Applies To

- SampleBusSignalData (see page 114) object

Description

Given a range, returns an array of acquired data. GetDataBySample returns the data within a trigger relative sample range.

NOTE

The data can only be returned when the hardware is stopped. Before calling this method, call the Instrument object's **WaitComplete** (see page 200) method to make sure the hardware is stopped.

VB Syntax

object.GetDataBySample StartSample, EndSample, DataType, NumRowsRet

Parameters	Definition
object	An expression that evaluates to an SampleBusSignalData (see page 114) object.
StartSample	A **Long** containing the first sample to upload.
EndSample	A **Long** containing the last sample to upload. EndSample must be greater than or equal to StartSample.
DataType	Specifies the type of data to return. See DataTypes and Return Values (see page 160).

Returns	Definition
NumRowsRet	A **Long** initialized by this method to the number of rows being returned in the array.

Return Values

See DataTypes and Return Values (see page 160).

See Also

- GetDataByTime (see page 161) method
- StartSample (see page 235) property
- EndSample (see page 221) property
- GetTime (see page 172) method

DataTypes and Return Values

AgtDataType	Enum Value	Return Value
AgtDataRaw	&H0001 (1)	Returns an array of **Byte**s. The total size of the array is NumRowsRet multiplied by the value in the BusSignal (see page 85) object's ByteSize (see page 212) property. This can hold the maximum BusSignal size of 128 bits of unsigned data. This type is the most efficient in terms of bytes transferred. Using this type, only the smallest number of bytes needed to represent every channel in a bus/signal will be transferred. The bus/signal values are stored in the array from MSB to LSB.
AgtDataDecimal	&H0002 (2)	Returns an array of **Variant**s. The **Variant** contains a decimal data type that holds 96 bits of unsigned and signed integer data. Decimals are stored as 96-bit unsigned integers scaled by a variable power of 10. The power of 10 scaling factor specifies the number of digits to the right of the decimal point and ranges from 0 to 28. This data type can be used when the BusSignalType (see page 211) property is **AgtBusSignalSampleNum**, when the GetTime (see page 172) method is called, when the bus/signal is oscilloscope voltage data, or when the bus/signal you are getting data for is less than 96 bits wide, unsigned. No error is returned if the data is truncated.
AgtDataLong	&H0003 (3)	Returns an array of **Long**s. This holds 31 bits of unsigned integer data and 32 bits of signed integer data. This data type can be used when the BusSignalType (see page 211) property is **AgtBusSignalSampleNum** or when the bus/signal you are getting data for is less than 32 bits wide, unsigned. No error is returned if the data is truncated.
AgtDataTime	&H0004 (4)	Returns an array of **Double**s. This data type is only valid when the GetTime (see page 172) method is called. You can also use **AgtDataDouble** and **AgtDataDecimal** to access time values as well.
AgtDataStringDec	&H0005 (5)	Returns an array of **String**s, formatted in decimal.

AgtDataStringHex	&H0006 (6)	Returns an array of **String**s, formatted in hexadecimal. When the GetTime (see page 172) method is called, the value is formatted as a hex string in units of 10**-24 seconds. When the bus/signal is oscilloscope voltage data, the value is formatted as a hex string in units of 10**-12 volts. In both cases, the string is an exact representation of the internal value; therefore, no information is lost.
AgtDataString	&H0007 (7)	Returns an array of **String**s using the default format.
AgtDataDouble	&H0008 (8)	Returns an array of **Double**s. This holds 52 bits of unsigned integer data and 53 bits of signed integer data. This data type can be used when the BusSignalType (see page 211) property is **AgtBusSignalSampleNum**, when the GetTime (see page 172) method is called for any bus/signal, when the bus/signal is oscilloscope voltage data, or when the bus/signal you are getting data for is less than 52 bits wide, unsigned. No error is returned if the data is truncated.

OR'ed in AgtDataType	Enum Value	Return Value

AgtDataSubrows	&H0100 (256)	Returns an array of arrays of type specified by the lower 8 bits of **EnumValue**.
		For example, if the **EnumValue** is a bitwise OR of AgtDataString and AgtDataSubrows (see code examples below), an array of string arrays will be returned. This is used to return multiple rows of data per sample, for example, when an inverse assembler returns multiple rows of decoded strings per sample. If the sample does not contain subrows, the array for that sample will typically contain one value; however, when the BusSignalType (see page 211) property is **AgtBusSignalGenerated**, there are cases when the array may be empty.
		`sArray() = GetDataBySample(0,10, AgtDataString Or AgtDataSubrows, nNumRowsRet)  ' Visual Basic`
		`sArray = GetDataBySample(0,10, AgtDataString | AgtDataSubrows, nNumRowsRet);  /* C/C++ */`

AgtDataSigned	&H0200 (512)	Returns signed values of type specified by the lower 8 bits of **EnumValue**. This value is ignored for **EnumValueAgtDataRaw**. For example, if the **EnumValue** is a bitwise OR of AgtDataDouble and AgtDataSigned, each sample will be converted to a signed value and returned as an array of doubles.

GetDataByTime Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 115)]

Applies To

- SampleBusSignalData (see page 114) object

Description

Given a range, returns an array of acquired data. GetDataByTime returns the data within a trigger relative time range.

NOTE

The data can only be returned when the hardware is stopped. Before calling this method, call the Instrument object's **WaitComplete** (see page 200) method to make sure the hardware is stopped.

VB Syntax object.GetDataByTime StartTime, EndTime, DataType, NumRowsRet

Parameters	Definition
object	An expression that evaluates to an SampleBusSignalData (see page 114) object.
StartTime	A **Double** containing the starting time (in seconds) to upload. **Double** values can be expressed as mmm**E**eee or mmm**D**eee, in which mmm is the mantissa and eee is the exponent (a power of 10); for example, a StartTime value of 450E-9 is 450 nanoseconds.
EndTime	A **Double** containing the ending time (in seconds) to upload. **EndTime** must be greater than or equal to **StartTime**.
DataType	Specifies the type of data to return. See DataTypes and Return Values (see page 160).

Returns	Definition
NumRowsRet	A **Long** initialized by this method to the number of rows being returned in the array.

Return Values See DataTypes and Return Values (see page 160).

See Also
- GetDataBySample (see page 159) method
- StartTime (see page 236) property
- EndTime (see page 221) property
- GetTime (see page 172) method

GetGroupCaption Method

[Automation Home (see page 3)] [Objects (see page 83)]

Applies To
- VbaViewChartData (see page 133) object

Description Gets the caption associated with a group (row).

VB Syntax object.GetGroupCaption Group

Parameters	Definition
object	An expression that evaluates to a VbaViewChartData (see page 133) object.
Group	A **Long** representing the group (row) on which to set the caption.

Return Value A String containing the group caption.

See Also
- SetGroupCaption (see page 194) method

GetLine Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 107)]

Applies To
- PattgenModule (see page 106) object

Description Gets an instruction or vector at line number.

VB Syntax object.GetLine LineNumber

Parameters	Definition
object	An expression that evaluates to a PattgenModule (see page 106) object.
LineNumber	A **Long** representing the line number from which to get the instruction or vector.

Return Value A String containing the InstructionOrVector (see page 163) at the specified line number.

See Also

- SetLine (see page 194) method

InstructionOrVector

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 107)]

Applies To

- GetLine (see page 162) method
- InsertLine (see page 181) method
- SetLine (see page 194) method

Description An InstructionOrVector string contains a pattern generator instruction or vector.

Syntax The syntax is like the syntax used in the user-interface with the exception of Vectors. With vectors, a "label=value" syntax is used to lessen ambiguity. The syntax is as follows:

- `Vector <label_value>, <label_value>, ...`
- `Start Loop Repeat <integer> [ times | time ]`
- `User-Defined Macro '<macro_name>' (<parameter_value>, <parameter_value>, ...)`
- `Wait for External Event [ A | B | C | D ] { = ([ <wait_pattern> + <wait_pattern> + ... | Any | None ]) }`
- `Wait for Arm in from [ '<module_name>' | 'External Trigger' ] [ , '<module_name>' | 'External Trigger' ]*`
- `Send Arm out to [ '<module_name>' | 'External Trigger' ] [ , '<module_name>' | 'External Trigger' ]*`
- `Break`

Where:

`<label_value>`	`'<label_name>' = <value>`
`<parameter_value>`	`'<parameter_name>' = <value>`

<wait_pattern>	A 3-digit binary number as in the user-interface (for example, 001).
<module_name>	The name of a module in the frame.
<value>	Values are formatted consistently with XML and COM number formatting. Numbers are case-insensitive and must contain a number base prefix: ▪ h – hexadecimal ▪ o – octal ▪ b – binary ▪ d – decimal Numbers can optionally contain don't care symbols: ▪ X – don't care Some example values are: • hfx • o72 • b11110000 • d24 • b1111xxxx

Unsupported Instructions

The following instructions are not supported for inserting or modifying because they always exist within the main sequence or are implicitly created:

- Init Start
- Init End
- Main Start
- Main End
- End Loop

Examples

- Vector 'My Bus 1' = h1, 'My Bus 2' = h2, 'My Bus 3' = h3, 'My Bus 4' = h4, 'My Bus 5' = h5
- Start Loop Repeat 25 times
- User-Defined Macro 'My Macro 1' ("MyParam1"=11, "MyParam2"=22, "MyParam3"=33)
- Wait for External Event A = (000 + 001 + 010)
- Wait for Arm in from 'External Trigger', 'My 1674x/5x-1'
- Send Arm out to 'My 1674x/5x-1'
- Break

See Also

- GetLine (see page 162) method
- InsertLine (see page 181) method
- SetLine (see page 194) method

GetLineLabel Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 107)]

Applies To

- PattgenModule (see page 106) object

Description

Gets a vector's label value at line number.

VB Syntax

object.GetLineLabel LineNumber, LabelName

Parameters	Definition
object	An expression that evaluates to a PattgenModule (see page 106) object.
LineNumber	A **Long** representing the line number from which to get the instruction or vector.
LabelName	A **String** name of label whose value you wish to get.

Return Value A String containing the value of the label name.

See Also
- SetLineLabel (see page 194) method

GetModuleByName Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 165)]

Applies To
- Instrument (see page 98) object

Description Given a module name, returns its corresponding hardware module object.

VB Syntax object.GetModuleByName Name

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.
Name	A **String** containing the module's name as defined by the Name (see page 227) property.

Return Value A hardware Module (see page 105) object with the module name given.

See Also
- Modules (see page 227) property
- Name (see page 227) property

GetModuleByName Example

Visual Basic

```
' When using Visual Basic outside of the Keysight Logic Analyzer
' application, you must create the Connect object (see
page 95) and use it
' to access the Instrument object.  In this example, "myInst"
' represents the Instrument object.
'
' When "using the Advanced Customization Environment (ACE)" (in the
online help),
' the Instrument object is already created and is globally
' accessible using "AgtLA".  In this example, substitute "myInst"
' with "AgtLA" to access the global Instrument object in VBA.

' Get the module named "My 16910A-1".
Dim myModule As AgtLA.Module
Set myModule = myInst.GetModuleByName("My 16910A-1")

' Display the module status.
MsgBox "Module: " + myModule.Name + ", status: " + myModule.Status
```

Visual C++

```
//
//  This simple Visual C++ Console application demonstrates how to use
//  the Keysight 168x/169x/169xx COM interface to get a module by name
```

```
//  and display its status.
//
//  This project was created in Visual C++ Developer.  To create a
//  similar project:
//
//    - Execute File -> New
//    - Select the Projects tab
//    - Select "Win32 Console Application"
//    - Select A "hello,World!" application (Visual Studio 6.0)
//
//  To make this buildable, you need to specify your "import" path
//  in stdafx.h (search for "TODO" in that file).  For example, add:
//  #import "C:/Program Files/Keysight Technologies/Logic Analyzer/LA \
//  COM Automation/agClientSvr.dll"
//
//  To run, you need to specify the host logic analyzer to connect
//  to (search for "TODO" below).
//

#include "stdafx.h"


////////////////////////////////////////////////////////////////////////
//
//  Forward declarations.
//
void DisplayError(_com_error& err);


////////////////////////////////////////////////////////////////////////
//
//  main() entry point.
//
int main(int argc, char* argv[])
{
   printf("*** Main()\n");

   //
   //  Initialize the Microsoft COM/ActiveX library.
   //
   HRESULT hr = CoInitialize(0);

   if (SUCCEEDED(hr))
   {
      try {   // Catch any unexpected run-time errors.
         _bstr_t hostname = "mtx33";   // TODO, use your logic
                                       // analysis system hostname.
         printf("Connecting to instrument '%s'\n", (char*) hostname);

         // Create the connect object and get the instrument object.
         AgtLA::IConnectPtr pConnect =
               AgtLA::IConnectPtr(__uuidof(AgtLA::Connect));
         AgtLA::IInstrumentPtr pInst =
               pConnect->GetInstrument(hostname);

         // Get a specific analyzer module.
         _bstr_t moduleName = "My 16910A-1";
```

```
            AgtLA::IAnalyzerModulePtr pAnalyzer =
                  pInst->GetModuleByName(moduleName);

            // Display the module status.
            _bstr_t name = pAnalyzer->GetName();
            _bstr_t status = pAnalyzer->GetStatus();
            printf("Module '%s', status '%s'.\n", (char*) name,
                  (char*) status);
         }
         catch (_com_error& e) {
            DisplayError(e);
         }

         // Uninitialize the Microsoft COM/ActiveX library.
         CoUninitialize();
      }
      else
      {
         printf("CoInitialize failed\n");
      }

      return 0;
}


//////////////////////////////////////////////////////////////////////
//
//  Displays the last error -- used to show the last exception
//  information.
//
void DisplayError(_com_error& error)
{
   printf("*** DisplayError()\n");

   printf("Fatal Unexpected Error:\n");
   printf("  Error Number = %08lx\n", error.Error());

   static char errorStr[1024];
   _bstr_t desc = error.Description();

   if (desc.length() == 0)
   {
      // Don't have a description string.
      strcpy(errorStr, error.ErrorMessage());
      int nLen = lstrlen(errorStr);

      // Remove funny carriage return ctrl<M>.
      if (nLen > 2 && (errorStr[nLen - 2] == 0xd))
      {
         errorStr[nLen - 2] = '\0';
      }
   }
   else
   {
      strcpy(errorStr, desc);
   }
```

```
    printf("  Error Message = %s\n", (char*) errorStr);
}
```

GetNumSamples Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 115)]

Applies To

- SampleBusSignalData (see page 114) object

Description

Given a range, returns the number of samples stored.

NOTE

The data can only be returned when the hardware is stopped. Before calling this method, call the Instrument object's **WaitComplete** (see page 200) method to make sure the hardware is stopped.

VB Syntax

object.GetNumSamples [StartPosition], [EndPosition]

Parameters	Definition
object	An expression that evaluates to an SampleBusSignalData (see page 114) object.
StartPosition EndPosition	**Variant**s specifying the data range (see page 152). **EndPosition** must be greater than or equal to **StartPosition**.

Return Values

A Long containing the number of samples in the range.

GetProbeByName Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Instrument (see page 98) object

Description

Given a probe name, returns the corresponding probe object.

VB Syntax

object.GetProbeByName Name

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.
Name	A **String** containing the probe's name as defined by the Name (see page 227) property.

Return Value

A Probe (see page 111) object with the name given.

See Also

- Probe (see page 111) object
- Probes (see page 111) object
- Instrument (see page 98) object
- Name (see page 227) property

GetProtocolDataFields Method

[Automation Home (see page 3)] [Objects (see page 83)]

Applies To

- ProtocolWindow object (see page 114)

Description Gets the acquisition data for the fields displayed in the Protocol Viewer.

VB Syntax `object.GetProtocolDataFields start end channel success`

Parameters	Definition
object	An expression that evaluates to a ProtocolWindow (see page 114) object.
start	A **VARIANT** which specifies the first packet in a range of packets for which the acquisition data is fetched. If *start* is an integer, then *start* is interpreted as the packet number for the first packet in the range. If *start* is a floating point number, then *start* is interpreted as the packet time of the first packet in the range.
end	A **VARIANT** which specifies the last packet in a range of packets for which the acquisition data is fetched. If *end* is an integer, then end is interpreted as the packet number for the last packet in the range. If *end* is a floating point number, then *end* is interpreted as the packet time for the last packet in the range. ***NOTE***: "start" and "end" must either be both integers (i.e. packets numbers) or be both floating point numbers (i.e. packet times).
channel	A **string** which specifies the channel (or direction) of the sample numbers specified as the start and end parameters. channel is used only if start and end are integers representing packet numbers. channel is ignored if start and end are floating point numbers representing packet times.
success	A **VARIANT_BOOL** output parameter which returns VARIANT_TRUE or VARIANT_FALSE. VARIANT_TRUE means the operation was successful and the return string contains data. VARIANT_FALSE means an error occurred and the return string contains an error message.

Remarka GetProtocolDataFields returns a string that contains one or more lines. The first line in the string is a heading. Subsequent lines contain acquisition data. For each packet in the specified range of packets, there is one acquisition data line. Each data line contains a series of values separated by commas. This series of values is as per the fields displayed in the Packets pane of the Protocol Viewer. If you want to choose the fields that the method returns in a data line, you must insert, delete, or re-arrange the fields according to your requirements in the Packets pane of the Protocol Viewer.

GetRawData Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- AnalyzerModule (see page 84) object

Description Given a range, returns the raw analyzer data.

NOTE The data can only be returned when the hardware is stopped. Before calling this method, call the Instrument object's **WaitComplete** (see page 200) method to make sure the hardware is stopped.

VB Syntax object.GetRawData StartPosition, EndPosition, NumBytesPerRow, NumRowsRet

Parameters	Definition
object	An expression that evaluates to an AnalyzerModule (see page 84) object.
StartPosition EndPosition	**Variant**s specifying the data range (see page 152). **EndPosition** must be greater than or equal to **StartPosition**.

Returns	Definition
NumBytesPerRow	A **Long** initialized by this method to the width of each sample row being returned in the array.
NumRowsRet	A **Long** initialized by this method to the number of rows being returned in the array.

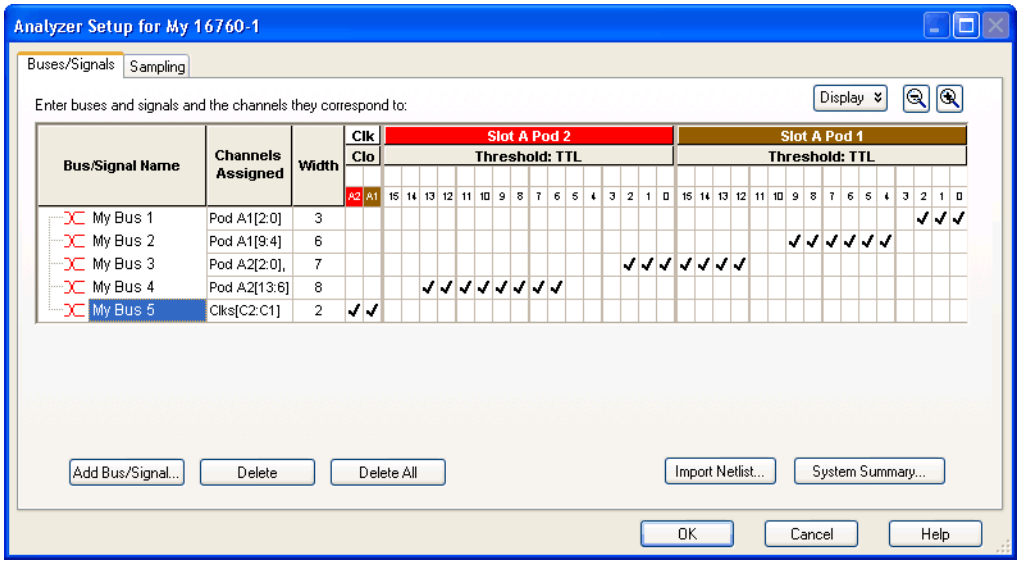
Return Values

Returns a Variant array of Bytes. The total size of the array is NumRowsRet multiplied by NumBytesPerRow.

The data is returned in the following format (which is reversed from the byte order that appears in the Buses/Signals Setup dialog):

```
Pod 1, Pod 2, Pod 3, ..., Clock
```

For example, if the logic analyzer has two pods:



The data would be stored in array like:

```
 Pod 1       Pod 1       Pod 2       Pod 2       Clocks
  7..0       15..8        7..0       15..8         1..0
--------    --------    --------    --------    --------
array[0]    array[1]    array[2]    array[3]    array[4]
```

The Clock bytes are rounded up to the nearest byte; for example, if there are 10 clock channels, the data is stored in two bytes.

See Also

- GetRawTimingZoomData (see page 170) method

GetRawTimingZoomData Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- AnalyzerModule (see page 84) object

Description

Given a range, returns the raw analyzer timing zoom data.

NOTE The data can only be returned when the hardware is stopped. Before calling this method, call the Instrument object's **WaitComplete** (see page 200) method to make sure the hardware is stopped.

VB Syntax object.GetRawTimingZoomData StartPosition, EndPosition, NumBytesPerRow, NumRowsRet

Parameters	Definition
object	An expression that evaluates to an AnalyzerModule (see page 84) object.
StartPosition EndPosition	**Variant**s specifying the data range (see page 152). **EndPosition** must be greater than or equal to **StartPosition**.

Returns	Definition
NumBytesPerRow	A **Long** initialized by this method to the width of each sample row being returned in the array.
NumRowsRet	A **Long** initialized by this method to the number of rows being returned in the array.

Return Values Returns an array of Bytes. The total size of the array is NumRowsRet multiplied by NumBytesPerRow.

The data is returned in the following format (which is reversed from the bit order that appears in the Buses/Signals Setup dialog):

```
Pod 1, Pod 2, Pod 3, ..., Clock
```

The Clock bytes are rounded up to the nearest byte; for example, if there are 10 clock channels, the data is stored in two bytes.

See Also

- GetRawData (see page 169) method

GetRemoteInfo Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Connect (see page 95) object

Description Gets the logic analyzer's remote user login and computer name.

This method gives you information about who is remotely connected via COM to the logic analyzer. This is a passive interrogation and does not modify the current values returned by RemoteComputerName (see page 232) and RemoteUserName (see page 232).

VB Syntax object.GetRemoteInfo HostNameOrIPAddress, RemoteUserName, RemoteComputerName

Parameters	Definition
object	An expression that evaluates to a Connect (see page 95) object.
HostNameOrIPAddress	A **String** that is the hostname or IP address of the logic analyzer.

Returns	Definition
RemoteUserName	A **String** that is the remote user login name.
RemoteComputerName	A **String** that is the remote computer name.

See Also

- RemoteComputerName (see page 232) property
- RemoteUserName (see page 232) property

GetSampleNumByTime Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 115)]

Applies To

- SampleBusSignalData (see page 114) object

Description

Gets the closest sample number corresponding to the time given.

NOTE

The sample number can only be returned when the hardware is stopped. Before calling this method, call the Instrument object's **WaitComplete** (see page 200) method to make sure the hardware is stopped.

VB Syntax

object.GetSampleNumByTime Time

Parameters	Definition
object	An expression that evaluates to an SampleBusSignalData (see page 114) object.
Time	A **Double** containing the time that you want to get the sample number for. **Double** values can be expressed as mmm**E**eee or mmm**D**eee, in which mmm is the mantissa and eee is the exponent (a power of 10); for example, a Time value of 450E-9 is 450 nanoseconds.

Return Values

A Long containing the sample number.

GetTime Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 115)]

Applies To

- SampleBusSignalData (see page 114) object

Description

Given a range, returns the time for this bus/signal in the format specified by the data type given. GetTime gets the time values for the specific bus/signal.

NOTE

The time can only be returned when the hardware is stopped. Before calling this method, call the Instrument object's **WaitComplete** (see page 200) method to make sure the hardware is stopped.

VB Syntax

object.GetTime StartPosition, EndPosition, DataType, NumRowsRet

Parameters	Definition
object	An expression that evaluates to an SampleBusSignalData (see page 114) object.
StartPosition EndPosition	**Variant**s specifying the data range (see page 152). **EndPosition** must be greater than or equal to **StartPosition**.
DataType	Specifies the type of data to return. See DataTypes and Return Values (see page 160).

Returns	Definition
NumRowsRet	A **Variant** initialized by this method to the number of rows being returned in the time array.

Return Values See DataTypes and Return Values (see page 160).

See Also
- GetDataByTime (see page 161) method
- GetDataBySample (see page 159) method

GetToolByName Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To
- Instrument (see page 98) object

Description Given a tool name, returns its corresponding tool object.

VB Syntax object.GetToolByName Name

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.
Name	A **String** containing the tool's name as defined by the Name (see page 227) property.

Return Value A Tool (see page 128) object with the tool name given.

See Also
- Tools (see page 240) property
- Name (see page 227) property

GetTriggerSampleNumber Method

[Automation Home (see page 3)] [Objects (see page 83)]

Applies To
- ProtocolWindow (see page 114) object

Description Gets the packet number and channel of the trigger packet.

VB Syntax object.GetTriggerSampleNumber success PacketNumber

Parameters	Definition
object	An expression that evaluates to a ProtocolWindow (see page 114) object.
success	A **VARIANT_BOOL** output parameter which returns VARIANT_TRUE or VARIANT_FALSE. VARIANT_TRUE means the operation was successful and the return string contains the channel name. VARIANT_FALSE means an error occurred and the return string contains an error message.
PacketNumber	An **integer** output parameter which returns the packet number of the trigger packet.

See Also

- GetProtocolDataFields (see page 168) method

GetValueCaption Method

[Automation Home (see page 3)] [Objects (see page 83)]

Applies To

- VbaViewChartData (see page 133) object

Description

Gets the caption associated with all values at index (column).

VB Syntax

object.GetValueCaption Index

Parameters	Definition
object	An expression that evaluates to a VbaViewChartData (see page 133) object.
Index	A **Long** representing the index (column) from which to get the caption.

Return Value

A String containing the value caption.

See Also

- SetValueCaption (see page 196) method

GetWindowByName Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Instrument (see page 98) object

Description

Given a window name, returns the corresponding window object.

VB Syntax

object.GetWindowByName Name

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.
Name	A **String** containing the window's name as defined by the Name (see page 227) property.

Return Value

A Window (see page 136) object with the tool name given.

See Also

- Window (see page 136) object
- Windows (see page 137) object
- Instrument (see page 98) object
- Name (see page 227) property

GoOffline Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 175)]

Applies To

- Instrument (see page 98) object

Description

Disconnects the user interface from the logic analyzer frame.

VB Syntax

object.GoOffline

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.

See Also

- GoOnline (see page 178) method
- IsOnline (see page 181) method

GoOffline Example

Visual Basic

```
Option Explicit   ' Must define all variables.

Sub Main()

' Define the logic analysis systems being used.
Dim myFirstLAS As String
Dim mySecondLAS As String
myFirstLAS = "mtx33"
mySecondLAS = "col-mil20"

' When using Visual Basic outside of the Keysight Logic Analyzer
' application, you must create the Connect object (see
page 95) and use it
' to access the Instrument object.  In this example, "myInst"
' represents the Instrument object.

Dim myConnect As AgtLA.Connect
Dim myInst As AgtLA.Instrument
Set myConnect = CreateObject("AgtLA.Connect")
Set myInst = myConnect.Instrument(myFirstLAS)

' When "using the Advanced Customization Environment (ACE)" (in the
online help),
' the Instrument object is already created and is globally
' accessible using "AgtLA".  In this example, comment out
' the preceding four lines; then, substitute "myInst" with
' "AgtLA" to access the global Instrument object in VBA.

' Display whether the instrument is offline or online.
DisplayConnected myInst, myFirstLAS

' Go offline.
myInst.GoOffline
DisplayConnected myInst, myFirstLAS

' Go online to second logic analysis system.
myInst.GoOnline (mySecondLAS)
```

```
DisplayConnected myInst, myFirstLAS

' Go offline.
myInst.GoOffline
DisplayConnected myInst, myFirstLAS

' Go online to first logic analysis system.
myInst.GoOnline (myFirstLAS)
DisplayConnected myInst, myFirstLAS

End Sub

Private Sub DisplayConnected(inst As AgtLA.Instrument, system As String)

  Dim connectedTo As String
  If inst.IsOnline(connectedTo) Then
    MsgBox "LA system: " + system + ", is online, connected to: " + _
        connectedTo
  Else
    MsgBox "LA system: " + system + ", is offline."
  End If

End Sub
```

Visual C++

```
//
//  This simple Visual C++ Console application demonstrates how to use
//  the Keysight 168x/169x/169xx COM interface to take a logic analysis
//  system offline and then go back online again.
//
//  This project was created in Visual C++ Developer.  To create a
//  similar project:
//
//    - Execute File -> New
//    - Select the Projects tab
//    - Select "Win32 Console Application"
//    - Select A "hello,World!" application (Visual Studio 6.0)
//
//  To make this buildable, you need to specify your "import" path
//  in stdafx.h (search for "TODO" in that file).  For example, add:
//  #import "C:/Program Files/Keysight Technologies/Logic Analyzer/LA \
//  COM Automation/agClientSvr.dll"
//
//  To run, you need to specify the logic analysis systems to connect
//  to (search for "TODO" below).
//

#include "stdafx.h"


////////////////////////////////////////////////////////////////////////
//
//  Forward declarations.
//
void DisplayConnected(
  AgtLA::IInstrumentPtr  pInst,
  _bstr_t                system);
```

```
void DisplayError(_com_error& err);


//////////////////////////////////////////////////////////////////////
//
//  main() entry point.
//
int main(int argc, char* argv[])
{
   printf("*** Main()\n");

   //
   //  Initialize the Microsoft COM/ActiveX library.
   //
   HRESULT hr = CoInitialize(0);

   if (SUCCEEDED(hr))
   {
      try {   // Catch any unexpected run-time errors.
         _bstr_t myFirstLAS = "mtx33";   // TODO, use your first logic
                                         // analysis system hostname.
         _bstr_t mySecondLAS = "col-mil20";   // TODO, use your second
                                              // logic analysis system
                                              // hostname.
         printf("Connecting to instrument '%s'\n", (char*) myFirstLAS);

         // Create the connect object and get the instrument object.
         AgtLA::IConnectPtr pConnect =
               AgtLA::IConnectPtr(__uuidof(AgtLA::Connect));
         AgtLA::IInstrumentPtr pInst =
               pConnect->GetInstrument(myFirstLAS);

         // Display whether the instrument is offline or online.
         DisplayConnected(pInst, myFirstLAS);

         // Go offline.
         pInst->GoOffline();
         DisplayConnected(pInst, myFirstLAS);

         // Go online to second logic analysis system.
         pInst->GoOnline(mySecondLAS, 1, FALSE, "", FALSE);
         DisplayConnected(pInst, myFirstLAS);

         // Go offline.
         pInst->GoOffline();
         DisplayConnected(pInst, myFirstLAS);

         // Go online to first logic analysis system.
         pInst->GoOnline(myFirstLAS, 1, FALSE, "", FALSE);
         DisplayConnected(pInst, myFirstLAS);

      }
      catch (_com_error& e) {
         DisplayError(e);
      }

      // Uninitialize the Microsoft COM/ActiveX library.
```

```
      CoUninitialize();
   }
   else
   {
      printf("CoInitialize failed\n");
   }

   return 0;
}


////////////////////////////////////////////////////////////////////////
//
//  Displays whether a logic analysis system if offline or online,
//  and if online the system it it connected to.
//
void DisplayConnected(
  AgtLA::IInstrumentPtr  pInst,
  _bstr_t                system)
{
   printf("*** DisplayConnected()\n");

   BSTR connectedTo;
   if (pInst->IsOnline(&connectedTo)) {
      printf("LA system '%s', is online, connected to '%S'.\n",
            (char*) system, (char*) connectedTo);
   }
   else {
      printf("LA system '%s', is offline.\n", (char*) system);
   }
   SysFreeString(connectedTo);

}


////////////////////////////////////////////////////////////////////////
//
//  Displays the last error -- used to show the last exception
//  information.
//
void DisplayError(_com_error& error)
{
   printf("*** DisplayError()\n");

   printf("Fatal Unexpected Error:\n");
   printf("  Error Number = %08lx\n", error.Error());

   static char errorStr[1024];
   _bstr_t desc = error.Description();

   if (desc.length() == 0)
   {
      // Don't have a description string.
      strcpy(errorStr, error.ErrorMessage());
      int nLen = lstrlen(errorStr);

      // Remove funny carriage return ctrl<M>.
```

```
        if (nLen > 2 && (errorStr[nLen - 2] == 0xd))
        {
           errorStr[nLen - 2] = '\0';
        }
     }
     else
     {
        strcpy(errorStr, desc);
     }

     printf("  Error Message = %s\n", (char*) errorStr);
}
```

GoOnline Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 175)]

Applies To

- Instrument (see page 98) object

Description

Connects the user interface to a specific logic analyzer frame. The frame is locked to this user interface until it is released by calling the GoOffline (see page 174) method.

VB Syntax

object.GoOnline [ComputerNameOrIPAddress=""] [FrameNumber=1] [SaveChanges=False] [SaveFileName=""] [SetupOnly=False]

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.
ComputerNameOrIPAddress	A **String** containing the frame's computer host name as defined by the ComputerName (see page 216) property or IP address as defined by the IPAddress (see page 224) property.
FrameNumber	A **Long** that specifies the number of the frame to connect to in a multiframe configuration.
SaveChanges	A **Boolean** that specifies whether changes to the current configuration should be saved.
SaveFileName	A **String** containing the name of the file to which current configuration information should be saved.
SetupOnly	A **Boolean** that specifies whether the file to which the current configuration will be saved contains captured data or just setup information: **True** – save only setup information. **False** – save data and setup information.

See Also

- GoOffline (see page 174) method
- IsOnline (see page 181) method

GoToPosition Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Window (see page 136) object

Description

Moves the center of the window to a new position.

VB Syntax

object.GoToPosition Position

Parameters	Definition
object	An expression that evaluates to a Window (see page 136) object.
Position	A **Variant** that specifies the time of the sample to be placed at the center of the window. For time values, use the variant type **Double**.

Import Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Instrument (see page 98) object

Description

Imports data from a file located on the instrument file system.

VB Syntax

object.Import ImportFileName [SaveChanges=False] [SaveFileName=""] [SetupOnly=False]

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.
ImportFileName	A **String** that contains the name of the file (on the instrument file system) to be imported.
SaveChanges	A **Boolean** that specifies whether changes to the current configuration should be saved.
SaveFileName	A **String** containing the name of the file to which current configuration information should be saved.
SetupOnly	A **Boolean** that specifies whether the file to which the current configuration will be saved contains captured data or just setup information: **True** – save only setup information. **False** – save data and setup information.

Remarks

The import file must be directly accessible by the instrument.

The only supported file format is 167xx fast binary. This file can have any suffix (*.*). To import other file types, use the ImportEx (see page 180) method.

See Also

- ImportEx (see page 180) method
- Export (see page 151) method
- ExportEx (see page 152) method

ImportEx Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Instrument (see page 98) object

Description

Imports data from a file located on the instrument file system into a particular module.

VB Syntax

object.ImportEx ImportFileName DestinationName [SaveChanges=False] [SaveFileName=""] [SetupOnly=False]

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.
ImportFileName	A **String** that contains the name of the file (on the instrument file system) to be imported.
DestinationName	A **String** that is the name of the module into which the data is imported.
SaveChanges	A **Boolean** that specifies whether changes to the current configuration should be saved.
SaveFileName	A **String** containing the name of the file to which current configuration information should be saved.
SetupOnly	A **Boolean** that specifies whether the file to which the current configuration will be saved contains captured data or just setup information: **True** – save only setup information. **False** – save data and setup information.

Remarks The import file must be directly accessible by the instrument.

The supported file types are:

- "Module CSV text file" (*.csv) – If DestinationName is not found, an import module is created with that name.
- "Pattern Generator CSV text file" (*.csv) – if the DestinationName is a pattern generator module.
- "Pattern Generator Binary file" (*.pgb) – if the DestinationName is a pattern generator module.
- "16700 Fast Binary Data" – if DestinationName is empty.

See Also

- Import (see page 179) method
- Export (see page 151) method
- ExportEx (see page 152) method

InsertLine Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 107)]

Applies To

- PattgenModule (see page 106) object

Description Inserts a new instruction or vector after line number.

VB Syntax object.InsertLine LineNumber, InstructionOrVector

Parameters	Definition
object	An expression that evaluates to a PattgenModule (see page 106) object.
LineNumber	A **Long** representing the line number after which the new instruction or vector should be inserted.
InstructionOrVector	A **String** containing the instruction or vector (see page 163) to be inserted.

See Also

- RemoveLine (see page 191) method

IsOnline Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 175)]

Applies To

- Instrument (see page 98) object

Description Tells whether the user interface is connected to a logic analyzer frame.

VB Syntax object.IsOnline ComputerName

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.
ComputerName	A **String** that is initialized to the frame's name (as defined by the ComputerName (see page 216) property) if the user interface is online (connected to a frame).

Return Value A Boolean indicating whether the user interface is connected to a frame. If True is returned, the ComputerName will be initialized.

See Also
- GoOffline (see page 174) method
- GoOnline (see page 178) method

IsTimingZoom Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To
- BusSignal (see page 85) object

Description Is this a timing zoom bus/signal?

VB Syntax object.IsTimingZoom

Parameters	Definition
object	An expression that evaluates to an BusSignal (see page 85) object.

Return Value A Boolean indicating whether it is a timing zoom bus/signal.

New Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To
- Instrument (see page 98) object

Description Creates a new instrument Overview.

VB Syntax object.New [SaveChanges=False] [SaveFileName=""] [SetupOnly=False]

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.
SaveChanges	A **Boolean** that specifies whether changes to the current configuration should be saved.
SaveFileName	A **String** that is the name of the file to which current configuration information should be saved.
SetupOnly	A **Boolean** that specifies whether the file to which the current configuration will be saved contains captured data or just setup information: **True** – save only setup information. **False** – save data and setup information.

Open Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Instrument (see page 98) object

Description

Loads a previously saved configuration file located on the instrument file system. This will restore the instrument's settings and contents of the acquisition memory (if available). You can open either ALA or XML format configuration files.

VB Syntax

object.Open OpenFileName [SaveChanges=False] [SaveFileName=""] [SetupOnly=False]

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.
OpenFileName	A **String** that contains the name of the file located on the Instrument.
SaveChanges	A **Boolean** that specifies whether changes to the current configuration should be saved.
SaveFileName	A **String** containing the name of the file to which current configuration information should be saved.
SetupOnly	A **Boolean** that specifies whether the file to which the current configuration will be saved contains captured data or just setup information: **True** – save only setup information. **False** – save data and setup information.

Remarks

The configuration file must be directly accessible by the instrument.

See Also

- Save (see page 193) method

PanelLock Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 183)]

Applies To

- Instrument (see page 98) object

Description

Coordinates user access to the instrument front panel or remote display with other users. When locked, a full screen message is displayed indicating the instrument is currently in use by a remote COM automation program. If desired, a custom message can be shown on the local display instead of a default message. As an example, a custom message might give information as to who has the unit locked. The instrument can then be unlocked when desired.

NOTE

This method will block further execution when called from within an integrated Visual Basic for Applications (VBA) macro (because it runs from within the application).

VB Syntax

object.PanelLock [Message = ""]

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.
Message	A **String** containing a custom message that will be shown on the display. If the message is empty, then a default message will be used.

See Also

- PanelUnlock (see page 186) method

PanelLock Example

Visual Basic

```
' When using Visual Basic outside of the Keysight Logic Analyzer
' application, you must create the Connect object (see
page 95) and use it
' to access the Instrument object.  In this example, "myInst"
' represents the Instrument object.
'
' When "using the Advanced Customization Environment (ACE)" (in the
online help),
' the Instrument object is already created and is globally
' accessible using "AgtLA".  In this example, substitute "myInst"
' with "AgtLA" to access the global Instrument object in VBA.

' Lock the instrument's front panel.
myInst.PanelLock ("Locked by Name, Phone")

' If locked, display the message.
Dim myMessage As String
If myInst.PanelLocked(myMessage) Then
   MsgBox "Remote user message: " + myMessage
End If

' Unlock the instrument's front panel.
myInst.PanelUnlock
```

Visual C++

```
//
//  This simple Visual C++ Console application demonstrates how to use
//  the Keysight 168x/169x/169xx COM interface to lock and unlock the
//  instrument's front panel.
//
//  This project was created in Visual C++ Developer.  To create a
//  similar project:
//
//    - Execute File -> New
//    - Select the Projects tab
//    - Select "Win32 Console Application"
//    - Select A "hello,World!" application (Visual Studio 6.0)
//
//  To make this buildable, you need to specify your "import" path
//  in stdafx.h (search for "TODO" in that file).  For example, add:
//  #import "C:/Program Files/Keysight Technologies/Logic Analyzer/LA \
//  COM Automation/agClientSvr.dll"
//
//  To run, you need to specify the host logic analyzer to connect
//  to (search for "TODO" below).
//

#include "stdafx.h"


////////////////////////////////////////////////////////////////////
//
//  Forward declarations.
//
void DisplayError(_com_error& err);


////////////////////////////////////////////////////////////////////
```

```
//
//  main() entry point.
//
int main(int argc, char* argv[])
{
   printf("*** Main()\n");

   //
   //  Initialize the Microsoft COM/ActiveX library.
   //
   HRESULT hr = CoInitialize(0);

   if (SUCCEEDED(hr))
   {
      try {   // Catch any unexpected run-time errors.
         _bstr_t hostname = "mtx33";   // TODO, use your logic
                                       // analysis system hostname.
         printf("Connecting to instrument '%s'\n", (char*) hostname);

         // Create the connect object and get the instrument object.
         AgtLA::IConnectPtr pConnect =
               AgtLA::IConnectPtr(__uuidof(AgtLA::Connect));
         AgtLA::IInstrumentPtr pInst =
               pConnect->GetInstrument(hostname);

         // Lock the instrument's front panel.
         pInst->PanelLock("Locked by Name, Phone");

         // If locked, display the message.
         BSTR myMessage;
         if (pInst->GetPanelLocked(&myMessage)) {
            printf("Remote user message '%S'\n", (char*) myMessage);
         }
         SysFreeString(myMessage);

         // Unlock the instrument's front panel.
         pInst->PanelUnlock();
      }
      catch (_com_error& e) {
         DisplayError(e);
      }

      // Uninitialize the Microsoft COM/ActiveX library.
      CoUninitialize();
   }
   else
   {
      printf("CoInitialize failed\n");
   }

   return 0;
}


//////////////////////////////////////////////////////////////////////
//
//  Displays the last error -- used to show the last exception
```

```
//  information.
//
void DisplayError(_com_error& error)
{
   printf("*** DisplayError()\n");

   printf("Fatal Unexpected Error:\n");
   printf("  Error Number = %08lx\n", error.Error());

   static char errorStr[1024];
   _bstr_t desc = error.Description();

   if (desc.length() == 0)
   {
      // Don't have a description string.
      strcpy(errorStr, error.ErrorMessage());
      int nLen = lstrlen(errorStr);

      // Remove funny carriage return ctrl<M>.
      if (nLen > 2 && (errorStr[nLen - 2] == 0xd))
      {
         errorStr[nLen - 2] = '\0';
      }
   }
   else
   {
      strcpy(errorStr, desc);
   }

   printf("  Error Message = %s\n", (char*) errorStr);
}
```

PanelUnlock Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 183)]

Applies To

- Instrument (see page 98) object

Description

Re-enables user access to the instrument front panel or remote display.

VB Syntax

object.PanelUnlock

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.

See Also

- PanelLock (see page 183) method

QueryCommand Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 148)]

Applies To

- Instrument (see page 98) object
- Module (see page 105) object
- Probe (see page 111) object

- Tool (see page 128) object
- Window (see page 136) object

Description Query for XML-based commands.

VB Syntax object.QueryCommand Query, XMLCommand

Parameters	Definition
object	An expression that evaluates to one of the objects in the "Applies to" list above.
Query	A **String** that contains either an XML-based query command or an XML-based filter. If a filter is specified, the query command will be set to "GetAllSetup", and the output of the command will be filtered so that it only contains the attributes or tags of interest as specified by the 'Query' filter string. When a filter is used, the string returned may not be valid XML format. If the 'Query' starts with the character '<', it is treated as an XML-based filter (see page 187); otherwise, it is treated as an XML-based query (see page 187) command.

Returns	Definition
XMLCommand	A **String** that contains the XML-based command.

Return Values A Boolean indicating whether the command was successful.

XML-Based Query An XML-based query command is specific to the Module, Tool, or Window. If queries are supported, the query "GetAllSetup" returns all of the setup commands.

For information about the XML-based query commands supported by a tool, see the "Tool Control, COM Automation" topic in the tool's online help.

XML-Based Filter A filter can be either a fully qualified XML string or a shortened XML string. A shortened XML string does not contain end tag notation and has the following format:

```
<tag [attribute[=value]] ...> ...
```

Example of a fully qualified XML string filter:

```
' When using Visual Basic outside of the Keysight Logic Analyzer
' application, you must create the Connect object (see
page 95) and use it
' to access the Instrument object.  In this example, "myInst"
' represents the Instrument object.
'
' When "using the Advanced Customization Environment (ACE)" (in the
online help),
' the Instrument object is already created and is globally
' accessible using "AgtLA".  In this example, substitute "myInst"
' with "AgtLA" to access the global Instrument object in VBA.

Dim queryOutput As String

myInst.QueryCommand _
  "<Setup>" & _
    "<Module Name=''>" & _
      "<BusSignalSetup>" & _
        "<BusSignal Name=''/>" & _
      "</BusSignalSetup>" & _
```

```
      "</Module>" & _
    "</Setup>", queryOutput
```

`queryOutput` contains:

```
Name="MyLA-1"
Name="My Bus 1"
```

Example of a shortened XML string filter:

```
myInst.QueryCommand "<Setup><Module Name><BusSignalSetup>" + _
      "<BusSignal Name>", queryOutput
```

`queryOutput` contains:

```
Name="MyLA-1"
Name="My Bus 1"
```

Both examples are equivalent and, when called, return the first module's name and its first bus/signal name.

1 If an attribute is not present at the end, the entire tag is returned. For example:

```
myInst.QueryCommand "<Setup><Module><BusSignalSetup><BusSignal>",
_
      queryOutput
```

`queryOutput` contains:

```
<BusSignal Name='My Bus 1' Polarity='Positive' DefaultBase='Hex'
      Comment=''>
<Channels>Pod 1[7:0]</Channels>
</BusSignal>
```

2 More than one attribute can be returned. For example:

```
myInst.QueryCommand "<Setup><Module><BusSignalSetup>" + _
      "<BusSignal Name Polarity>", queryOutput
```

`queryOutput` contains:

```
Name="My Bus 1"
Polarity="Positive"
```

3 Tags are used to disambiguate; you can skip beginning and intermediate tag levels. Use with caution because the first tag found is used. For example:

```
myInst.QueryCommand "<Setup><BusSignal Name>", queryOutput
```

`queryOutput` contains:

```
Name="Sample Number"
```

NOTE You might have expected Name to be 'My Bus 1' instead of 'Sample Number'. Because a breadth-first search is done, the BusSignal tag for 'Listing-1' is at a higher level than 'My 1690A-1'. This is why care should be taken when skipping tag levels.

4 If an '=' sign and a non-empty value are used, the tag with the given attribute value is used. This is useful when there is more than one tag with the same name at the same level, like BusSignal. For example:

```
myInst.QueryCommand "<Setup><Module><BusSignalSetup>" + _
      "<BusSignal Name='My Bus 2' Polarity>", queryOutput
```

`queryOutput` contains:

```
Polarity="Positive"
```

5 White space is ignored. For example:

```
myInst.QueryCommand "< Setup > < BusSignal Name >", queryOutput
```

`queryOutput` contains:

```
Name="Sample Number"
```

See Also

- "XML Format" (in the online help)

RecallTriggerByFile Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 27)]

Applies To

- AnalyzerModule (see page 84) object
- SerialModule object (see page 128)

Description

Loads a previously saved trigger file located on the instrument's file system.

VB Syntax

object.RecallTriggerByFile TriggerFileName

Parameters	Definition
object	An expression that evaluates to an AnalyzerModule (see page 84) or a SerialModule (see page 128) object.
TriggerFileName	A **String** that contains the name of the XML-format trigger specification file located on the instrument's file system.

Remarks

The RecallTriggerByFile method is a shortcut that reads an XML-format trigger specification file from the instrument's file system and sets the Trigger (see page 240) property of the applicable object (AnalyzerModule or SerialModule in this case).

See Also

- AnalyzerModule (see page 84) object
- SerialModule object (see page 128)

RecallTriggerByName Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- AnalyzerModule (see page 84) object

Description

Loads a named trigger from the recall buffer.

VB Syntax

object.RecallTriggerByName TriggerName

Parameters	Definition
object	An expression that evaluates to an AnalyzerModule (see page 84) object.
TriggerName	A **String** that represents the recall buffer title name.

See Also

- AnalyzerModule (see page 84) object

RecvFile Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- ConnectSystem (see page 95) object

Description

Copies a file from the remote logic analyzer system to your local system.

The Connect (see page 146) method must be called first to establish a connection to the logic analyzer from which the file will be copied.

VB Syntax

object.RecvFile SrcFileName, DestFileName

Parameters	Definition
object	An expression that evaluates to a ConnectSystem (see page 95) object.
SrcFileName	A **String** that is the name of the file on the remote logic analyzer system.
DestFileName	A **String** that is the name of the file on the local file system.

See Also

- Connect (see page 146) method

Remove Method (BusSignals Object)

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- BusSignals (see page 90) object

Description

Removes a bus/signal from the BusSignals collection.

VB Syntax

BusSignals (see page 90).Remove Name

Parameters	Definition
Name	A **String** containing the name of the bus/signal to be removed.

Remove Method (Markers Object)

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 101)]

Applies To

- Markers (see page 100) object

Description

Removes a marker from the Markers collection.

VB Syntax

object.Remove Name

Parameters	Definition
object	An expression that evaluates to a **Markers (see page 100)** object.
Name	A **String** containing the name of the marker to be removed.

RemoveAll Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 101)]

Applies To
- Markers (see page 100) object

Description Removes all markers from the Markers collection.

VB Syntax object.RemoveAll

Parameters	Definition
object	An expression that evaluates to a **Markers (see page 100)** object.

RemoveXML Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 101)]

Applies To
- Markers (see page 100) object

Description Removes multiple Marker (see page 100) objects from the Markers (see page 100) collection using an XML string.

VB Syntax object.RemoveXML XMLMarkers

Parameters	Definition
object	An expression that evaluates to a **Markers (see page 100)** object.
XMLMarkers	An "XML format" (in the online help)**String** containing the markers to remove (see "<Markers> element" (in the online help)).

RemoveLine Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 107)]

Applies To
- PattgenModule (see page 106) object

Description Removes the instruction or vector at line number.

VB Syntax object.RemoveLine LineNumber

Parameters	Definition
object	An expression that evaluates to a PattgenModule (see page 106) object.
LineNumber	A **String** representing the instruction/vector line number or line number range to be removed. For example: ▪ "5" – removes line 5. ▪ "5..12" – removes lines 5 through 12. ▪ "5:12" – another way to remove lines 5 through 12. ▪ "All" – removes all lines.

See Also
- InsertLine (see page 181) method

Reset Method (PattgenModule Object)

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To
- PattgenModule (see page 106) object

Description Resets the current line number to the first line.

VB Syntax object.Reset

Parameters	Definition
object	An expression that evaluates to a PattgenModule (see page 106) object.

See Also
- Run (see page 192) method
- Stop (see page 199) method
- Step (see page 198) method
- Resume (see page 192) method

Resume Method (PattgenModule Object)

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To
- PattgenModule (see page 106) object

Description Resumes running the pattern generator from the current line number.

VB Syntax object.Resume

Parameters	Definition
object	An expression that evaluates to a PattgenModule (see page 106) object.

See Also
- Run (see page 192) method
- Stop (see page 199) method
- Step (see page 198) method
- Reset (see page 191) method

Run Method (Instrument Object)

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To
- Instrument (see page 98) object

Description Starts running all modules.

VB Syntax object.Run [Repetitive=False]

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.
Repetitive	A Boolean indicating the number of times the module(s) are started. **True** – run continuously until the Stop (see page 198) method is called. **False** – run only once.

See Also
- Stop (see page 198) method
- Status (see page 236) property
- WaitComplete (see page 200) method

Run Method (PattgenModule Object)

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- PattgenModule (see page 106) object

Description

Starts running the pattern generator.

VB Syntax

object.Run [Repetitive=False]

Parameters	Definition
object	An expression that evaluates to a PattgenModule (see page 106) object.
Repetitive	A Boolean indicating the number of times the module is started. **True** – run continuously until the Stop (see page 199) method is called. **False** – run only once.

See Also

- Stop (see page 199) method
- Step (see page 198) method
- Resume (see page 192) method
- Reset (see page 191) method
- Status (see page 236) property
- WaitComplete (see page 200) method

Save Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Instrument (see page 98) object

Description

Saves the current configuration to a file on the instrument file system.

VB Syntax

object.Save SaveFileName [SetupOnly=False]

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.
SaveFileName	A **String** that contains the name of the file to be saved on the Instrument. If the filename string has a suffix of ".xml", the configuration is saved to an XML format file; if the filename string has a suffix of ".ala" or has no suffix at all, the configuration is saved to an ALA format file.
SetupOnly	A **Boolean** that specifies whether the file to which the current configuration will be saved contains captured data or just setup information: **True** – save only setup information. **False** – save data and setup information.

Remarks

The file is stored onto a drive that is directly accessible by the instrument.

See Also

- Open (see page 182) method

SendFile Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- ConnectSystem (see page 95) object

Description Copies a file from your local system to the remote logic analyzer system.

The Connect (see page 146) method must be called first to establish a connection to the logic analyzer to which the file will be copied.

VB Syntax object.SendFile SrcFileName, DestFileName

Parameters	Definition
object	An expression that evaluates to a ConnectSystem (see page 95) object.
SrcFileName	A **String** that is the name of the file on the local file system.
DestFileName	A **String** that is the name of the file on the remote logic analyzer system.

See Also

- Connect (see page 146) method

SetGroupCaption Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

Applies To

- VbaViewChartData (see page 133) object

Description Sets the caption associated with a group (row).

VB Syntax object.SetGroupCaption Group, Caption

Parameters	Definition
object	An expression that evaluates to a VbaViewChartData (see page 133) object.
Group	A **Long** representing the group (row) on which to set the caption.
Caption	A **String** that is the caption to be set.

See Also

- GetGroupCaption (see page 162) method

SetLine Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 107)]

Applies To

- PattgenModule (see page 106) object

Description Sets an instruction or vector at line number.

VB Syntax object.SetLine LineNumber, InstructionOrVector

Parameters	Definition
object	An expression that evaluates to a PattgenModule (see page 106) object.
LineNumber	A **Long** representing the line number at which the instruction or vector should be set.
InstructionOrVector	A **String** containing the instruction or vector (see page 163) to be inserted.

See Also

- GetLine (see page 162) method

SetLineLabel Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 107)]

Applies To

- PattgenModule (see page 106) object

Description

Sets a vector's label value at line number.

VB Syntax

object.SetLineLabel LineNumber, LabelName, Value

Parameters	Definition
object	An expression that evaluates to a PattgenModule (see page 106) object.
LineNumber	A **Long** representing the line number from which to get the instruction or vector.
LabelName	A **String** name of label whose value you wish to set.
Value	A **String** representing the label's value.

See Also

- GetLineLabel (see page 164) method

SetValue Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

Applies To

- VbaViewChartData (see page 133) object

Description

Sets an individual value in the chart array.

VB Syntax

object.SetValue Group, Index, Value

Parameters	Definition
object	An expression that evaluates to a VbaViewChartData (see page 133) object.
Group	A **Long** representing the group (row) on which to set the value.
Index	A **Long** representing the index (column) on which to set the value.
Value	A **Variant** that is the value to set in the chart.

See Also

- SetValueArray (see page 195) method

SetValueArray Method

[Automation Home (see page 3)] [Objects (see page 83)]

Applies To

- VbaViewChartData (see page 133) object

Description

Sets an array of values in the chart array starting at index 0.

VB Syntax

object.SetValueArray Group, ValueArray

Parameters	Definition
object	An expression that evaluates to a VbaViewChartData (see page 133) object.
Group	A **Long** representing the group (row) on which to set the value array.
ValueArray	An array of **Variant**s that are the values to set in the chart.

See Also

- SetValue (see page 195) method

SetValueCaption Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

Applies To

- VbaViewChartData (see page 133) object

Description

Sets the caption associated with all values at index (column).

VB Syntax

object.SetValueCaption Index, Caption

Parameters	Definition
object	An expression that evaluates to a VbaViewChartData (see page 133) object.
Index	A **Long** representing the index (column) on which to set the caption.
Caption	A **String** that is the caption to be set.

See Also

- GetValueCaption (see page 173) method

SimpleTrigger Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 31)]

Applies To

- AnalyzerModule (see page 84) object

Description

Trigger on a simple condition with optional occurrence and storage qualification. Default triggers on anything and stores everything.

VB Syntax

object.SimpleTrigger [OnEvent = "Anything"], [Occurs=1], [StoreEvent="Anything"]

Parameters	Definition
object	An expression that evaluates to an AnalyzerModule (see page 84) object.
OnEvent	A **String** containing the Event (see page 196) to trigger on.
Occurs	A **Long** containing the number of occurrences of **OnEvent** before triggering.
StoreEvent	A **String** containing the storage qualification Event (see page 196) while waiting for **OnEvent**.

Remarks

If the analyzer is in timing mode, the only valid value for StoreEvent is "Anything".

See Also

- RecallTriggerByFile (see page 188) method
- RecallTriggerByName (see page 189) method

Simple Trigger/Find Event

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 31)]

Applies To

- SimpleTrigger (see page 196) method
- Find (see page 154) method

Description

An Event contains either a ComboValue, the String "Anything", or the String "Nothing". For the Find (see page 154) method, an Event can only contain a ComboValue.

A ComboValue contains a BusSignal optionally followed by the String "And" or "Or" followed by another BusSignal.

A BusSignal contains a bus/signal name followed by a Relational followed by a Range, Value, or Edge.

A Relational string can be:

- "=", "!=", ">", "<", ">=", or "<="

Additional Relational strings used with the Find (see page 154) method are:

- "Entering" – the first sample of one or more consecutive samples that match the pattern. (By comparison, the "=" equals operator considers every sample that matches the pattern as an occurrence.)
- "Exiting" – the sample after one or more consecutive samples that match the pattern.
- "Transitioning" – entering or exiting one or more consecutive samples that match the pattern.

A Range contains a Value followed by the String ".." followed by another Value. Range values cannot contain don't care digits. A range can only be used with the Relational strings "=" and "!=".

A Value string contains a number with optional don't care digits or an edge. A number base is required; use the following prefixes:

- h – hexadecimal
- o – octal
- b – binary
- d – decimal

An Edge string begins with "e" followed by any combination of the following upper-case characters:

- X – don't care
- R – rising edge
- F – falling edge
- E – either edge
- G – glitch (only valid for the SimpleTrigger (see page 196) method)

Remarks

Value strings are case insensitive.

When an Edge string is used, the BusSignal's Relational string must be "=". When used with the Find (see page 154) method, an Edge specification can only be one bit wide, and you cannot specify a glitch. When used with the SimpleTrigger (see page 196) method, an Edge is only valid when the analyzer is in timing mode.

Bus/signal names that contain " And " (with spaces before and after), " Or " (with spaces before and after), or end in a non-alphanumeric character will confuse the parser and produce unexpected results.

Example

Value examples:

`hFFXX0022`	Hex number with 2 don't care digits (8 don't care bits).
`o7777xxxx`	Octal number with 4 don't care digits (12 don't care bits).
`b10110110xxxx0000`	Binary number with 4 don't care bits.

Range examples:

`hff00..hffff`	Range from hex ff00 to ffff.

Edge examples:

`eXXXXRFEG`	Edge specification with 4 don't care bits, then rising, falling, either, and glitch bits.
`eR`	A rising edge on a signal (one bit).

Event examples:

`ADDR=hffffxxxx`	Specifies a simple bus/signal value.
`ADDR=hffff0000..hffffffff`	Specifies the same simple bus/signal value as a range.
`ADDR=hffff0000..hffffffff And DATA=eXXXRXXXX`	Specifies a rising edge in bit 5 of DATA while ADDR is within the hex range ffff0000 to ffffffff.
`ADDR=hffxx And DATA=h055`	Specifies AND'ing two bus/signal values.

Trigger Event example:

`Anything`	Specifies any value.

Find Event example:

`ADDR entering hff00`	Specifies the first sample of one or more consecutive samples whose ADDR is hFF00.

See Also

- SimpleTrigger (see page 196) method
- Find (see page 154) method

Step Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- PattgenModule (see page 106) object

Description

Steps the pattern generator from the current line number.

VB Syntax

object.Step [Count=1]

Parameters	Definition
object	An expression that evaluates to a PattgenModule (see page 106) object.
Count	A **Long** indicating the number of vectors the pattern generator should output.

See Also

- Run (see page 192) method
- Stop (see page 199) method

Stop Method (Instrument Object)

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Instrument (see page 98) object

Description

Stops all currently running data acquisition modules (that is, not pattern generator modules). If you want to stop a pattern generator module, call the PattgenModule (see page 106) object's Stop (see page 199) method.

NOTE If self tests are running, this will also stop and close the Self Test dialog.

VB Syntax

object.Stop

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.

See Also

- Run (see page 192) method
- Status (see page 236) property

Stop Method (PattgenModule Object)

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- PattgenModule (see page 106) object

Description

Stops the pattern generator if it is currently running.

VB Syntax

object.Stop

Parameters	Definition
object	An expression that evaluates to a PattgenModule (see page 106) object.

See Also

- Step (see page 198) method
- Resume (see page 192) method
- Run (see page 192) method
- Reset (see page 191) method

TestAll Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 125)]

Applies To

- SelfTest (see page 125) object

Description

Runs an instrument's self-tests.

VB Syntax object.TestAll

Parameters	Definition
object	An expression that evaluates to a SelfTest (see page 125) object.

Return Values The TestAll method returns one of the following run result values:

- "RUN_RESULT_INIT_FAILED"
- "RUN_RESULT_FAILED"
- "RUN_RESULT_INCOMPLETE"
- "RUN_RESULT_PASSED"

VBADisplayHelpTopic Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Instrument (see page 98) object

Description Displays the help page and topic for an installed VBA project.

VB Syntax object.VBADisplayHelpTopic ProjectName [HelpTopic=""]

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.
ProjectName	A **String** that is the name of the VBA project. This is the same VBA project name that appears in the Project.xml file within the .zip file that contains the project sources.
HelpTopic	A **String** that is the name of a topic in the help file.

VBARunMacro Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Instrument (see page 98) object

Description Runs the specified VBA macro as if that macro was selected in the Macros dialog box.

VB Syntax object.VBARunMacro MacroName

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.
MacroName	A **String** that is the name of the VBA macro to run.

WaitComplete Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 201)]

Applies To

- AnalyzerModule (see page 84) object
- Instrument (see page 98) object
- Module (see page 105) object

- PattgenModule (see page 106) object

Description

Waits until a measurement completes or a timeout (in seconds) occurs.

Executing the Instrument (see page 98) object's WaitComplete method waits for all data acquisition modules (that is, not pattern generator modules), tools, and viewers to complete their measurements.

Executing a Module (see page 105) object's WaitComplete method waits for the module to complete its measurement.

VB Syntax

object.WaitComplete [Seconds="-1"]

Parameters	Definition
object	An expression that evaluates to one of the objects in the "Applies to" list above.
Seconds	A **Long** containing the maximum number of seconds to wait for the measurement to complete. **Note:** If set to -1, this method does not return until the specified measurement completes; therefore, we strongly recommend you make this value >= 0.

WaitComplete Example

Visual Basic

```
Private Sub Command1_Click()

' If WaitComplete times out, a run-time error occurs.
On Error GoTo ErrorHandler

' When using Visual Basic outside of the Keysight Logic Analyzer
' application, you must create the Connect object (see
page 95) and use it
' to access the Instrument object.  In this example, "myInst"
' represents the Instrument object.
'
' When "using the Advanced Customization Environment (ACE)" (in the
online help),
' the Instrument object is already created and is globally
' accessible using "AgtLA".  In this example, substitute "myInst"
' with "AgtLA" to access the global Instrument object in VBA.

' Load the configuration file.
myInst.Open ("c:\LA\Configs\Test1.ala")

' Load the logic analyzer trigger file.
Dim myAnalyzer As AgtLA.AnalyzerModule
Set myAnalyzer = myInst.GetModuleByName("My 16756A-1")
myAnalyzer.RecallTriggerByFile ("c:\LA\Triggers\Test1_TrigSpec.xml")

' Run the measurement, wait for it to complete.
myInst.Run
myInst.WaitComplete (20)

' Notify when measurement is complete.
MsgBox "Measurement complete."

Exit Sub
ErrorHandler:
```

```
   ' Handle the error that occurs if WaitComplete times out.
   Select Case Err.Number
      Case -2147352567
         myInst.Stop
         MsgBox "WaitComplete timed out, measurement stopped."
         Resume Next
      Case Else
         Err.Raise Number:=Err.Number
   End Select

End Sub
```

Visual C++

```
//
//  This simple Visual C++ Console application demonstrates how to
//  use the Keysight 168x/169x/169xx COM interface to wait until a
//  measurement is complete.
//
//  This project was created in Visual C++ Developer.  To create a
//  similar project:
//
//    - Execute File -> New
//    - Select the Projects tab
//    - Select "Win32 Console Application"
//    - Select A "hello,World!" application (Visual Studio 6.0)
//
//  To make this buildable, you need to specify your "import" path
//  in stdafx.h (search for "TODO" in that file).  For example, add:
//  #import "C:/Program Files/Keysight Technologies/Logic Analyzer/LA \
//  COM Automation/agClientSvr.dll"
//
//  To run, you need to specify the host logic analyzer to connect
//  to (search for "TODO" below).
//

#include "stdafx.h"


////////////////////////////////////////////////////////////////////////
//
//  Forward declarations.
//
void DisplayError(_com_error& err);


////////////////////////////////////////////////////////////////////////
//
//  main() entry point.
//
int main(int argc, char* argv[])
{
   printf("*** Main()\n");

   //
   //  Initialize the Microsoft COM/ActiveX library.
   //
   HRESULT hr = CoInitialize(0);
```

```
if (SUCCEEDED(hr))
{
   try {   // Catch any unexpected run-time errors.
      _bstr_t hostname = "mtx33";   // TODO, use your logic
                                    // analysis system hostname.
      printf("Connecting to instrument '%s'\n", (char*) hostname);

      // Create the connect object and get the instrument object.
      AgtLA::IConnectPtr pConnect =
            AgtLA::IConnectPtr(__uuidof(AgtLA::Connect));
      AgtLA::IInstrumentPtr pInst =
            pConnect->GetInstrument(hostname);

      // Load the configuration file.
      _bstr_t configFile = "C:\\LA\\Configs\\config.ala";
      printf("Loading the config file '%s'\n", (char*) configFile);
      pInst->Open(configFile, FALSE, "", TRUE);

      // Set up the trigger.
      _bstr_t moduleName = "MPC860 Demo Board";
      AgtLA::IAnalyzerModulePtr pAnalyzer =
            pInst->GetModuleByName(moduleName);
      pAnalyzer->SimpleTrigger("ADDR=0", 1, "Anything");

      // Run the measurement, wait for it to complete.
      pInst->Run(FALSE);
      try {
         pInst->WaitComplete(20);
         printf("Measurement complete.\n");
      }
      catch (_com_error& e) {
         switch (e.Error()) {
         case 0x80020009:
            pInst->Stop();
            printf("Inner WaitComplete timed out, ");
            printf("measurement stopped.\n");
            break;
         default:
            throw;
            break;
         };
      }
      printf("End of program.\n");
   }
   catch (_com_error& e) {
      DisplayError(e);
   }

   // Uninitialize the Microsoft COM/ActiveX library.
   CoUninitialize();
}
else
{
   printf("CoInitialize failed\n");
}

return 0;
```

```
}


////////////////////////////////////////////////////////////////////
//
//  Displays the last error -- used to show the last exception
//  information.
//
void DisplayError(_com_error& error)
{
   printf("*** DisplayError()\n");

   printf("Fatal Unexpected Error:\n");
   printf("  Error Number = %08lx\n", error.Error());

   static char errorStr[1024];
   _bstr_t desc = error.Description();

   if (desc.length() == 0)
   {
      // Don't have a description string.
      strcpy(errorStr, error.ErrorMessage());
      int nLen = lstrlen(errorStr);

      // Remove funny carriage return ctrl<M>.
      if (nLen > 2 && (errorStr[nLen - 2] == 0xd))
      {
         errorStr[nLen - 2] = '\0';
      }
   }
   else
   {
      strcpy(errorStr, desc);
   }

   printf("  Error Message = %s\n", (char*) errorStr);
}
```

WriteProtocolDataFieldsToFile Method

[**Automation Home** (see page 3)] [**Objects** (see page 83)]

Applies To

- ProtocolWindow object (see page 114)

Description

Writes the acquisition data displayed in various fields in the Protocol Viewer to a specified CSV file.

VB Syntax

```
object.WriteProtocolDataFieldsToFile start end channel csvfile success
```

Parameters	Definition
object	An expression that evaluates to a ProtocolWindow (see page 114) object.
start	A **VARIANT** which specifies the first packet in a range of packets for which the acquisition data is to be written to the specified file. If start is an integer, then start is interpreted as a packet number. If start is a floating point number, then start is interpreted as a packet time.
end	A **VARIANT** which specifies the last packet in a range of packets for which the acquisition data is to be written to the specified file. If end is an integer, then end is interpreted as a packet number. If end is a floating point number, then end is interpreted as a packet time. ***NOTE***: "start" and "end" must either be both integers (i.e. packets numbers) or be both floating point numbers (i.e. packet times).
channel	If the value for this string is specified as *all*, then all the acquired packets data is written to the specified CSV file. *start* and *end* parameters are then ignored. Else, this string specifies the channel (or direction) of the sample numbers in the *start* and *end* parameters. *channel* is used only if *start* and *end* are integers representing packet numbers. *channel* is ignored if *start* and *end* are floating point numbers representing packet times.
csvfile	A string that specifies the path and name of the CSV file to which the acquired data is to be written.
success	A **VARIANT_BOOL** output parameter which returns VARIANT_TRUE or VARIANT_FALSE. VARIANT_TRUE means the operation was successful and the return string contains data. VARIANT_FALSE means an error occurred and the return string contains an error message.

Remarka WriteProtocolDataFieldsToFile writes the acquired data to a CSV file in one or more lines. The first line in the file is a heading. Subsequent lines contain acquisition data. For each packet in the specified range of packets, there is one acquisition data line. Each data line contains a series of values separated by commas. This series of values is as per the fields displayed in the Packets pane of the Protocol Viewer. If you want to choose the fields that the method writes in a data line, you must insert, delete, or re-arrange the fields according to your requirements in the Packets pane of the Protocol Viewer.

WriteOutput Method

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- VbaViewWindow (see page 135) object

Description Writes a string to the output window.

VB Syntax object.WriteOutput.String

Parameters	Definition
object	An expression that evaluates to a VbaViewWindow object.
String	A String to be written to the VbaView window.

Properties

- Name Property (see page 227)
- NumLines Property (see page 228)
- OccurrencesFound Property (see page 228)
- Options Property (see page 229)
- Overview Property (see page 229)
- PanelLocked Property (see page 229)
- Polarity Property (see page 230)
- Position Property (see page 230)
- Position Property (of VbaViewChartLegend object) (see page 230)
- Probes Property (see page 231)
- Reference Property (see page 231)
- RemoteComputerName Property (see page 232)
- RemoteUserName Property (see page 232)
- RunningStatus Property (see page 233)
- SampleDifferences Property (see page 233)
- SampleNum Property (see page 233)
- SelfTest Property (see page 234)
- Setup Property (see page 234)
- Size Property (see page 235)
- Slot Property (see page 235)
- StartSample Property (see page 235)
- StartTime Property (see page 236)
- Status Property (see page 236)
- StatusMsg Property (see page 237)
- SubrowFound Property (see page 237)
- Symbols Property (see page 238)
- TargetControlPort Property (see page 238)
- TextColor Property (see page 239)
- TimeFound Property (see page 239)
- TimeFoundString Property (see page 239)
- Title Property (see page 240)
- Tools Property (see page 240)
- Trigger Property (see page 240)
- Type Property (see page 241)
- Value Property (see page 242)
- VBAVersion Property (see page 242)
- VBE Property (see page 242)
- Version Property (see page 243)
- WebBrowser Property (see page 243) (for the VbaViewWindow object)
- WebBrowser Property (see page 243) (for the VbaViewWebBrowser object)
- Windows Property (see page 244)
- _NewEnum Property (see page 244)

Activity Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- BusSignal (see page 85) object

Description

Gets the activity indicators of the bus/signal.

VB Syntax

object.Activity

Parameters	Definition
object	An expression that evaluates to a **BusSignal (see page 85)** object.

Remarks

The Activity property has the String type.

There is an activity indicator character for each signal, which can be:

- - (dash) – no activity
- H – activity level high
- L – activity level low
- T – activity level transition
- B – activity level is both high and low

Axis Property

[Automation Home (see page 3)] [Objects (see page 83)]

Applies To

- VbaViewChart (see page 132) object

Description

Gets the chart axis given an axis type.

VB Syntax

object.Axis AxisType

Parameters	Definition
object	An expression that evaluates to a VbaViewChart (see page 132) object.
AxisType	An **AgtChartAxisType** enumerated type value that identifies the X or Y axis. See the description below.

Remarks

The Axis property has the VbaViewChartAxis (see page 133) object type.

The AxisType parameter can have the following values:

AgtChartAxisType	Enum Value	Description
AgtChartAxisTypeX	1	
AgtChartAxisTypeY	2	

AxisBase Property

[Automation Home (see page 3)] [Objects (see page 83)]

Applies To

- VbaViewChartAxis (see page 133) object

Description

Gets or sets the chart axis base.

Formatting axis values in different bases is only supported when the chart type is AgtChartTypeXYScatter (see the VbaViewChart (see page 132) object's ChartType (see page 214) property).

VB Syntax object.AxisBase [=Base]

Parameters	Definition
object	An expression that evaluates to a VbaViewChartAxis (see page 133) object.
Base	An **AgtAxisBase** enumerated type value that can be one of the values described below.

Remarks The AxisBase property can have the following values:

AgtAxisBase	Enum Value	Description
AgtAxisBaseBinary	1	
AgtAxisBaseHex	2	
AgtAxisBaseOctal	3	
AgtAxisBaseDecimal	4	
AgtAxisBaseSignedDecimal	5	
AgtAxisBaseFloatingPoint	6	BitSize is ignored for this type

See Also

- BitSize (see page 210) property (of VbaViewChartAxis object)

BackgroundColor Property

[Automation Home (see page 3)] [Objects (see page 83)]

Applies To

- Marker (see page 100) object

Description Gets or sets the marker background color.

```
' Display the marker background color.
Dim myBackgroundColor As Long
myBackgroundColor = myMarker.BackgroundColor
MsgBox Str(myBackgroundColor)

' Set the marker background color to green.
myBackgroundColor = &H0000FF00
myMarker.BackgroundColor = myBackgroundColor
```

VB Syntax object.BackgroundColor [=Color]

Parameters	Definition
object	An expression that evaluates to a Marker (see page 100) object.
Color	A **Long** value that is the marker background color.

Remarks The BackgroundColor property has the Long type.

Color values have the following hexadecimal form: 0x00BBGGRR. The low-order byte (RR) contains a value for the relative intensity of red; the second byte (GG) contains a value for green; and the third byte (BB) contains a value for blue. The high-order byte must be zero. The maximum value for a single byte is &HFF. The color white is &H00FFFFFF, black is &H00000000, and red is &H000000FF.

BitSize Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- BusSignal (see page 85) object

Description

Gets the number of channels in the bus/signal.

VB Syntax

object.BitSize

Parameters	Definition
object	An expression that evaluates to an **BusSignal (see page 85)** object.

Remarks

The BitSize property has the Long type.

See Also

- ByteSize (see page 212) property

BitSize Property (of VbaViewChartAxis)

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- VbaViewChartAxis (see page 133) object

Description

Gets or sets the width of the data in bits. This is used to format the Axis values.

VB Syntax

object.BitSize [=BitSize]

Parameters	Definition
object	An expression that evaluates to an VbaViewChartAxis (see page 133) object.
BitSize	A **Long** value that specifies the width of the data in bits.

Remarks

The BitSize property has the Long type.

See Also

- AxisBase (see page 208) property

Bold Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

Applies To

- VbaViewChartFont (see page 134) object

Description

Gets or sets the text thickness.

VB Syntax

object.Bold [=Bold]

Parameters	Definition
object	An expression that evaluates to a VbaViewChartFont (see page 134) object.
Bold	A **Boolean** that specifies whether the text is bold.

Remarks The Bold property has the Boolean type.

BusSignalData Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 115)]

Applies To

- BusSignal (see page 85) object

Description Gets the data associated with a bus/signal.

VB Syntax object.BusSignalData

Parameters	Definition
object	An expression that evaluates to a BusSignal (see page 85) object.

Remarks The BusSignalData property has the BusSignalData (see page 86) object type.

BusSignalType Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 115)]

Applies To

- BusSignal (see page 85) object

Description Gets the type of bus/signal.

VB Syntax object.BusSignalType

Parameters	Definition
object	An expression that evaluates to a BusSignal (see page 85) object.

Remarks The BusSignalType property can have the following values:

AgtBusSignalType	Enum Value	Description
AgtBusSignalProbed	1	The bus/signal is associated with a physically probed connection.
AgtBusSignalGenerated	2	The bus/signal is generated by a tool (like an inverse assembler) and therefore does not have a physically probed connection. This type is also used for an external oscilloscope because its bus/signals are not physically probed directly by the logic analyzer.
AgtBusSignalSampleNum	3	Represents the sample number.
AgtBusSignalTime	4	Represents the sample's absolute time. This is obsolete. The "Time" data is no longer returned as a bus/signal. To get the time associated with bus/signal data, use the GetTime (see page 172) method of the SampleBusSignalData (see page 114) object.

The Activity (see page 207), Channels (see page 213), and Polarity (see page 230) properties are only valid when the BusSignalType property is AgtBusSignalProbed.

BusSignalDifferences Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 87)]

Applies To

- SampleDifference (see page 125) object

Description

Gets a collection of all the buses/signals with differences for this sample.

VB Syntax

object.BusSignalDifferences

Parameters	Definition
object	An expression that evaluates to a SampleDifference (see page 125) object.

Remarks

The BusSignalDifferences property has the BusSignalDifferences (see page 86) collection object type. Each item in the collection is a BusSignalDifference (see page 86) object.

BusSignals Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 115)]

Applies To

- Module (see page 105) object
- Tool (see page 128) object
- Window (see page 136) object

Description

Gets a collection of the module's defined buses/signals.

VB Syntax

object.BusSignals

Parameters	Definition
object	An expression that evaluates to one of the objects in the **Applies to** line.

Remarks

The BusSignals property has the BusSignals (see page 90) collection object type. Each item in the collection is a BusSignal (see page 85) object.

ByteSize Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 115)]

Applies To

- BusSignal (see page 85) object

Description

Gets the size of the bus/signal in bytes.

VB Syntax

object.ByteSize

Parameters	Definition
object	An expression that evaluates to an BusSignal (see page 85) object.

Remarks

The ByteSize property has the Long type.

If the size of the bus is not a multiple of 8, it will be rounded to the next byte. For example, if a bus is 17 bits wide, 3 bytes will be returned. This property is useful when attempting to extract data from a byte array (raw). See the GetDataBySample (see page 159) method.

See Also

- BitSize (see page 210) property

Caption Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

Applies To

- VbaViewChartTitle (see page 134) object

Description

Gets or sets the chart title caption.

VB Syntax

object.Caption [=Caption]

Parameters	Definition
object	An expression that evaluates to a VbaViewChartTitle (see page 134) object.
Caption	A **String** that represents the chart title caption.

Remarks

The Caption property has the String type.

CardModels Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Module (see page 105) object

Description

Gets the card model numbers.

VB Syntax

object.CardModels

Parameters	Definition
object	An expression that evaluates to a Module (see page 105) object.

Remarks

The CardModels property has the String type.

Channels Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- BusSignal (see page 85) object

Description

Gets the channels defined in the bus/signal.

VB Syntax

object.Channels

Parameters	Definition
Object	An expression that evaluates to a BusSignal (see page 85) object.
Channels	A **String** containing *MultiplePodChannels* or the **String** "*None*" if no channels are assigned. **MultiplePodChannels** contains a comma separated list of *PodChannels*. **PodChannels** contains a *PodNumber* followed by the **String** "*[*" followed by a comma separated list of individual channel *Number(s)* and *NumberRange(s)* followed by the **String** "*]*". ***Note:****Pod channels normally are in MSB to LSB notation unless you are trying to reorder channels.* **NumberRange** contains a *Number* followed by the **String** "**:**" followed by a *Number*. PodChannels Example: `Pod 1[9:7,5,3:1]` – this bus consists of 1 single channel *Number* and 2 *NumberRange's* for a total of 7 channels. They are Pod 1[9], Pod 1[8], Pod 1[7], Pod 1[5], Pod 1[3], Pod 1[2], Pod 1[1]. MultiplePodChannels Example: `Pod 2[3,1],Pod 3[10,5:3]` – this bus consists of 3 single channel *Numbers* and 1 *NumberRange* for a total of 6 channels Pod 2[3], Pod 2[1], Pod 3[10], Pod 3[5], Pod 3[4], Pod 3[3].

Remarks The Channels property has the String type.

Chart Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

Applies To

- VbaViewWindow (see page 135) object

Description Gets the Chart view.

VB Syntax object.Chart

Parameters	Definition
object	An expression that evaluates to a VbaViewWindow (see page 135) object.

Remarks The Chart property has the VbaViewChart (see page 132) object type.

ChartType Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

Applies To

- VbaViewChart (see page 132) object

Description Gets or sets the chart type.

VB Syntax object.ChartType [=Type]

Parameters	Definition
object	An expression that evaluates to a VbaViewChart (see page 132) object.
Type	An **AgtChartType** enumerated type value that can be one of the values described below.

Remarks The ChartType property can have the following values:

AgtChartType	Enum Value	Description
AgtChartTypeNone	1	
AgtChartTypeLine	2	
AgtChartTypeLineOnly	3	
AgtChartTypeXYScatter	4	
AgtChartTypeHorizontalBar	5	
AgtChartTypeVerticalBar	6	
AgtChartTypePie	7	
AgtChartTypeStackedVerticalBar	8	
AgtChartTypeStackedHorizontalBar	9	

Color Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

Applies To

- VbaViewChartFont (see page 134) object

Description

Gets or sets the text color.

VB Syntax

object.Color [=Color]

Parameters	Definition
object	An expression that evaluates to a VbaViewChartFont (see page 134) object.
Color	A **Long** value that represents the text color.

Remarks

The Color property has the Long type.

Color values have the following hexadecimal form: 0x00BBGGRR. The low-order byte (RR) contains a value for the relative intensity of red; the second byte (GG) contains a value for green; and the third byte (BB) contains a value for blue. The high-order byte must be zero. The maximum value for a single byte is &HFF. The color white is &H00FFFFFF, black is &H00000000, and red is &H000000FF.

Comments Property

[Automation Home (see page 3)] [Objects (see page 83)]

Applies To

- Marker (see page 100) object

Description

Gets or sets the marker comments.

VB Syntax

object.Comments [=Comments]

Parameters	Definition
object	An expression that evaluates to a Marker (see page 100) object.
Comments	A **String** containing the comments for the marker.

Remarks The Comments property has the String type.

ComputerName Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Frame (see page 97) object

Description Gets a frame's computer name.

VB Syntax object.ComputerName

-or-

object

Parameters	Definition
Object	An expression that evaluates to a **Frame** (see page 97) object. The ComputerName property is the default property of the **Frame** (see page 97) object. Accordingly, you do not have to reference ComputerName explicitly, as shown in the syntax.

Remarks The ComputerName property has the String type.

Count Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 216)]

Applies To

- BusSignalDifferences (see page 86) object
- BusSignals (see page 90) object
- Frames (see page 98) object
- Markers (see page 100) object
- Modules (see page 105) object
- Probes (see page 111) object
- SampleDifferences (see page 125) object
- Tools (see page 129) object
- Windows (see page 137) object

Description Gets the number of items in a collection.

VB Syntax object.Count

Parameters	Definition
object	An expression that evaluates to one of the objects in the **Applies to** list above.

Remarks The Count property has the Long type.

See Also

- Item (see page 224) property

Item and Count Example

The following example displays the channels for each bus/signal in the BusSignals collection:

Visual Basic

```
Dim myBusSignalChannels As String
Dim myBusSignal As AgtLA.BusSignal
For i = 0 To myInst.GetModuleByName("My 1690A-1").BusSignals.Count - 1
   Set myBusSignal = myInst.GetModuleByName("My 1690A-1").BusSignals(i)
   ' Add the bus/signal name and channels to the string.
   myBusSignalChannels = myBusSignalChannels + vbNewLine
   myBusSignalChannels = myBusSignalChannels + "Bus/signal: " + _
         myBusSignal.Name
   myBusSignalChannels = myBusSignalChannels + ", Channels: " + _
         myBusSignal.Channels
Next
MsgBox "Bus/signal names and channels: " + vbNewLine + _
      myBusSignalChannels
```

Visual C++

```
//
//  This simple Visual C++ Console application demonstrates how to
//  use the Keysight 168x/169x/169xx COM interface to display the
//  channels for all buses/signals.
//
//  This project was created in Visual C++ Developer.  To create a
//  similar project:
//
//    - Execute File -> New
//    - Select the Projects tab
//    - Select "Win32 Console Application"
//    - Select A "hello,World!" application (Visual Studio 6.0)
//
//  To make this buildable, you need to specify your "import" path
//  in stdafx.h (search for "TODO" in that file).  For example, add:
//  #import "C:/Program Files/Keysight Technologies/Logic Analyzer/LA \
//  COM Automation/agClientSvr.dll"
//
//  To run, you need to specify the host logic analyzer to connect
//  to (search for "TODO" below).
//

#include "stdafx.h"


////////////////////////////////////////////////////////////////////
//
//  Forward declarations.
//
void DisplayError(_com_error& err);


////////////////////////////////////////////////////////////////////
//
//  main() entry point.
//
int main(int argc, char* argv[])
{
   printf("*** Main()\n");

   //
   //  Initialize the Microsoft COM/ActiveX library.
   //
```

```
HRESULT hr = CoInitialize(0);

if (SUCCEEDED(hr))
{
   try {   // Catch any unexpected run-time errors.
      _bstr_t hostname = "mtx33";   // TODO, use your logic
                                    // analysis system hostname.
      printf("Connecting to instrument '%s'\n", (char*) hostname);

      // Create the connect object and get the instrument object.
      AgtLA::IConnectPtr pConnect =
            AgtLA::IConnectPtr(__uuidof(AgtLA::Connect));
      AgtLA::IInstrumentPtr pInst =
            pConnect->GetInstrument(hostname);

      // Load the configuration file.
      _bstr_t configFile = "C:\\LA\\Configs\\config.ala";
      printf("Loading the config file '%s'\n", (char*) configFile);
      pInst->Open(configFile, FALSE, "", TRUE);

      // Display the channels for all probed bus/signal.
      _bstr_t moduleName = "MPC860 Demo Board";
      _bstr_t busSignal;
      _bstr_t channels;

      AgtLA::IAnalyzerModulePtr pAnalyzer =
            pInst->GetModuleByName(moduleName);
      AgtLA::IBusSignalsPtr pBusSignals = pAnalyzer->GetBusSignals();

      for (long i = 0; i < pBusSignals->GetCount(); i++)
      {
         AgtLA::IBusSignalPtr pBusSignal = pBusSignals->GetItem(i);
         AgtLA::AgtBusSignalType busSignalType =
               pBusSignal->GetBusSignalType();

         if (busSignalType == AgtLA::AgtBusSignalProbed) {

            busSignal = pBusSignal->GetName();
            channels = pBusSignal->GetChannels();
            printf("Bus/signal '%s', channels '%s'.\n",
                  (char*) busSignal, (char*) channels);
         }
      }
   }
   catch (_com_error& e) {
      DisplayError(e);
   }

   // Uninitialize the Microsoft COM/ActiveX library.
   CoUninitialize();
}
else
{
   printf("CoInitialize failed\n");
}

return 0;
```

```
}


//////////////////////////////////////////////////////////////////////
//
//  Displays the last error -- used to show the last exception
//  information.
//
void DisplayError(_com_error& error)
{
   printf("*** DisplayError()\n");

   printf("Fatal Unexpected Error:\n");
   printf("  Error Number = %08lx\n", error.Error());

   static char errorStr[1024];
   _bstr_t desc = error.Description();

   if (desc.length() == 0)
   {
      // Don't have a description string.
      strcpy(errorStr, error.ErrorMessage());
      int nLen = lstrlen(errorStr);

      // Remove funny carriage return ctrl<M>.
      if (nLen > 2 && (errorStr[nLen - 2] == 0xd))
      {
         errorStr[nLen - 2] = '\0';
      }
   }
   else
   {
      strcpy(errorStr, desc);
   }

   printf("  Error Message = %s\n", (char*) errorStr);
}
```

CreatorName Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- BusSignal (see page 85) object

Description

Gets the name of the module, tool, or viewer that created this bus/signal.

VB Syntax

object.CreatorName

Parameters	Definition
object	An expression that evaluates to a BusSignal (see page 85) object.

Remarks

The CreatorName property has the String type.

Data Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

Applies To

- VbaViewChart (see page 132) object

Description Gets the chart axis given an axis type.

VB Syntax object.Data

Parameters	Definition
object	An expression that evaluates to a VbaViewChart (see page 132) object.

Remarks The Data property has the VbaViewChartData (see page 133) object type.

DataType Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- SampleBusSignalData (see page 114) object

Description Gets the recommended bus/signal data type.

Note that, while this is the recommended data type, other data types can be used for uploading the data.

VB Syntax object.DataType

Parameters	Definition
object	An expression that evaluates to a SampleBusSignalData (see page 114) object.

Remarks The DataType property can have values defined by the AgtDataType enumerated type. See DataTypes and Return Values (see page 160).

See Also

- BusSignalType (see page 211) property

Description Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Frame (see page 97) object
- Module (see page 105) object

Description Gets a description of the logic analyzer frame or module.

VB Syntax object.Description

Parameters	Definition
object	An expression that evaluates to a Frame (see page 97) or Module (see page 105) object.

Remarks The Description property has the String type.

There is no defined format for the description string; therefore, do not parse this string to extract specific information.

Differences Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- CompareWindow (see page 95) object

Description

Gets the number of differences found on the last comparison.

VB Syntax

object.Differences

Parameters	Definition
object	An expression that evaluates to a CompareWindow (see page 95) object.

Remarks

The Differences property has the Long type.

A comparison can be done directly by calling the Execute (see page 151) method or indirectly when its input data changes and comparisons are enabled in the user interface.

See Also

- Execute (see page 151) method

EndSample Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- SampleBusSignalData (see page 114) object

Description

Gets the data's ending sample number relative to trigger.

VB Syntax

object.EndSample

Parameters	Definition
object	An expression that evaluates to an SampleBusSignalData (see page 114) object.

Remarks

The EndSample property has the Long type.

See Also

- StartSample (see page 235) property

EndTime Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- SampleBusSignalData (see page 114) object

Description

Gets the data's ending time (in seconds) relative to trigger.

VB Syntax

object.EndTime

Parameters	Definition
object	An expression that evaluates to an SampleBusSignalData (see page 114) object.

Remarks

The EndTime property has the Double type.

See Also

- StartTime (see page 236) property

FaceName Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

Applies To

- VbaViewChartFont (see page 134) object

Description Gets or sets the text face name string.

VB Syntax object.FaceName [=FaceName]

Parameters	Definition
object	An expression that evaluates to a VbaViewChartFont (see page 134) object.
FaceName	A **String** value that is the font typeface name.

Remarks The FaceName property has the String type.

Font Property

[Automation Home (see page 3)] [Objects (see page 83)]

Applies To

- VbaViewChartTitle (see page 134) object

Description Gets the chart title font.

VB Syntax object.Font

Parameters	Definition
object	An expression that evaluates to a VbaViewChartTitle (see page 134) object.

Remarks The Font property has the VbaViewChartFont (see page 134) object type.

Found Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- FindResult (see page 97) object

Description Gets a Boolean value indicating whether the event was found.

VB Syntax object.Found

Parameters	Definition
object	An expression that evaluates to a FindResult (see page 97) object.

Remarks The Found property has the Boolean type.

Frame Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Module (see page 105) object

Description Gets the frame in which the module resides.

VB Syntax object.Frame

Parameters	Definition
object	An expression that evaluates to a Module (see page 105) object.

Remarks The Frame property has the Frame (see page 97) object type.

See Also
- Frame (see page 97) object
- Frames (see page 98) object

Frames Property

[Automation Home (see page 3)] [Objects (see page 83)]

Applies To
- Instrument (see page 98) object

Description Gets a collection of all logic analyzer frames connected via the multiframe connector.

VB Syntax object.Frames

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.

Remarks The Frames property has the Frames (see page 98) collection object type. Each item in the collection is a Frame (see page 97) object.

HasLegend Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

Applies To
- VbaViewChart (see page 132) object

Description Gets or sets if the legend is visible.

VB Syntax object.HasLegend [=HasLegend]

Parameters	Definition
object	An expression that evaluates to a VbaViewChart (see page 132) object.
HasLegend	A **Boolean** value that specifies whether the legend is visible.

Remarks The HasLegend property has the Boolean type.

HasTitle Property

[Automation Home (see page 3)] [Objects (see page 83)]

Applies To
- VbaViewChart (see page 132) object
- VbaViewChartAxis (see page 133) object

Description Gets or sets whether the title is visible.

VB Syntax object.HasTitle [=HasTitle]

Parameters	Definition
object	An expression that evaluates to one of the objects in the "Applies to" list above.
HasTitle	A **Boolean** value that specifies whether the title is visible.

Remarks The HasTitle property has the Boolean type.

Instrument Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Connect (see page 95) object

Description Gets the logic analyzer instrument object.

VB Syntax object.Instrument [HostNameOrIpAddress=""]

Parameters	Definition
object	An expression that evaluates to a Connect (see page 95) object.
HostNameOrIpAddress	A **String** that contains the hostname or IP address of the logic analyzer instrument or computer on which the *Keysight Logic Analyzer* application runs. This parameter is optional–if it is not specified, the computer name specified in the Distributed COM "Location" tab is used (see To verify remote computer Distributed COM properties (see page 21)).

Remarks The Instrument property has the Instrument (see page 98) object type.

IPAddress Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Frame (see page 97) object

Description Gets a frame's IP address(es). If the frame has more than one LAN card, a comma separated list of IP addresses will be returned.

VB Syntax object.IPAddress

Parameters	Definition
Object	An expression that evaluates to a **Frame** (see page 97) object.

Remarks The IPAddress property has the String type.

Item Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 216)]

Applies To

- BusSignalDifferences (see page 86) object

- BusSignals (see page 90) object
- Frames (see page 98) object
- Markers (see page 100) object
- Modules (see page 105) object
- Probes (see page 111) object
- SampleDifferences (see page 125) object
- Tools (see page 129) object
- Windows (see page 137) object

Description

Gets one of the objects in a collection given either an index or a name.

VB Syntax

object.Item [IndexOrName]

-or-

object IndexOrName

Parameters	Definition
Object	An expression that evaluates to one of the objects in the Applies To list above.
IndexOrName	A **Variant** that is a **Long** or **String** representing the zero-based index in the collection or the name of object.

Object	String Index
BusSignalDifferences (see page 86)	The BusSignalDifference's index.
BusSignals (see page 90)	The BusSignal's name (as defined by the Name (see page 227) property).
Frames (see page 98)	The Frame's computer name or IP address (as defined by the ComputerName (see page 216) or IPAddress (see page 224) properties, respectively).
Markers (see page 100)	The Marker's name (as defined by the Name (see page 227) property).
Modules (see page 105)	The Module's name (as defined by the Name (see page 227) property).
Probes (see page 111)	The Probe's name (as defined by the Name (see page 227) property).
SampleDifferences (see page 125)	The SampleDifference's index.
Tools (see page 129)	The Tool's name (as defined by the Name (see page 227) property).
Windows (see page 137)	The Window's name (as defined by the Name (see page 227) property).

Remarks

The Item property has the appropriate type of the object in the collection (BusSignalDifference (see page 86), BusSignal (see page 85), Frame (see page 97), Marker (see page 100), Module (see page 105), Probe (see page 111), SampleDifference (see page 125), Tool (see page 128), or Window (see page 136)).

If you specify numbers for *index*, do not store these for later use because the indices might change as items are added or removed.

The Item property is the default. Accordingly, you don't have to reference Item explicitly, as shown in the syntax.

Legend Property

[Automation Home (see page 3)] [Objects (see page 83)]

Applies To
- VbaViewChart (see page 132) object

Description Gets the chart legend.

VB Syntax object.Legend

Parameters	Definition
object	An expression that evaluates to a VbaViewChart (see page 132) object.

Remarks The Legend property has the VbaViewChartLegend (see page 134) object type.

Markers Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 101)]

Applies To
- Instrument (see page 98) object

Description Gets a collection of all markers.

VB Syntax object.Markers

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.

Remarks The Markers property has the Markers (see page 100) collection object type. Each item in the collection is a Marker (see page 100) object.

When this property is called, a snapshot of the current markers are returned. If markers are subsequently added or deleted, this property must be called again to get an updated snapshot.

Model Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To
- Instrument (see page 98) object
- Module (see page 105) object

Description Gets the model number of an object.

VB Syntax object.Model

Parameters	Definition
object	An expression that evaluates to a Module (see page 105) object.

Remarks The Model property has the String type.

The following table summarizes the results of using the Model property with the objects in the Applies To list:

Object	Results
Instrument (see page 98)	Gets the instrument's model number.
Module (see page 105)	Gets the module's model number. If the module consists of different card model numbers, they are separated with spaces. For example, an analyzer model would look like "16756A"; a two-card analyzer module containing two different card types would look like "16750A 16750B".

Modules Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Instrument (see page 98) object

Description

Gets a collection of all the enabled hardware modules in the instrument.

VB Syntax

object.Modules

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.

Remarks

The Modules property has the Modules (see page 105) collection object type. Each item in the collection is a Module (see page 105) object.

Name Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- BusSignal (see page 85) object
- BusSignalDifference (see page 86) object
- Marker (see page 100) object
- Module (see page 105) object
- Probe (see page 111) object
- Tool (see page 128) object
- Window (see page 136) object

Description

Gets or sets (where appropriate) the name of an object.

VB Syntax

object.Name [=NewName]

-or-

object

Parameters	Definition
Object	An expression that evaluates to one of the objects in the Applies To list above. The Name property is the default property of all objects in the list. Accordingly, you do not have to reference Name explicitly, as shown in the syntax.
NewName	A **String** containing the new name of the object.

Remarks

The Name property has the String type.

The following table summarizes the results of using the Name property with some of the objects in the Applies To list:

Object	Results
BusSignal (see page 85)	Gets or sets the name of the bus/signal.
BusSignalDifference (see page 86)	Gets the bus/signal name associated with the bus/signal difference.
Marker (see page 100)	Gets or sets the name of the marker.
Module (see page 105)	Gets or sets the name of the module. This is the name displayed in the instrument's Overview window.
Probe (see page 111)	Gets or sets the name of the probe. This is the name displayed in the instrument's Overview window.
Tool (see page 128)	Gets or sets the name of the tool. This is the name displayed in the instrument's Overview window.
Window (see page 136)	Gets or sets the name of the window. This is the name displayed in the instrument's Overview window.

NumLines Property

[Automation Home (see page 3)] [Objects (see page 83)]

Applies To

- PattgenModule (see page 106) object

Description

Gets the number of lines in the main sequence.

```
' Get the number of lines in the main sequence.
Dim myNumLines As Long
myNumLines = myPattgenModule.NumLines
MsgBox Str(myNumLines)
```

VB Syntax

object.NumLines

Parameters	Definition
object	An expression that evaluates to a PattgenModule (see page 106) object.

Remarks

The NumLines property has the Long type.

OccurrencesFound Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- FindResult (see page 97) object

Description

Gets a Long containing the number of times the event was found.

VB Syntax

object.OccurrencesFound

Parameters	Definition
object	An expression that evaluates to a FindResult (see page 97) object.

Remarks The OccurrencesFound property has the Long type.

Options Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 87)]

Applies To

- CompareWindow (see page 95) object

Description Gets or sets the Compare window's "XML-format" (in the online help) options specification.

VB Syntax object.Options [=Options]

Parameters	Definition
object	An expression that evaluates to a CompareWindow (see page 95) object.
Options	A **String** containing the "XML format" (in the online help)"<Options> element" (in the online help) information.

Remarks The Options property has the String type.

Overview Property

[Automation Home (see page 3)] [Objects (see page 83)]

Applies To

- Instrument (see page 98) object

Description Gets an XML version of the Overview (see the "XML format" (in the online help)"<Overview> element" (in the online help)).

```
' Display the instrument's XML-format overview specification.
Dim myOverview As String
myOverview = myInst.Overview
MsgBox myOverview
```

VB Syntax object.Overview

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.

Remarks The Overview property has the String type.

PanelLocked Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 183)]

Applies To

- Instrument (see page 98) object

Description Indicates whether the instrument's front panel is locked. If locked, it returns the displayed message.

VB Syntax object.PanelLocked Message

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.
Message	If the font panel is locked, a **String** containing the displayed message is returned.

Remarks The PanelLocked property has the Boolean type.

Polarity Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- BusSignal (see page 85) object

Description Gets the polarity of the bus/signal.

VB Syntax object.Polarity

Parameters	Definition
object	An expression that evaluates to a BusSignal (see page 85) object.

Remarks The Polarity property has the String type.

The polarity is either "+" or "-".

Position Property

[Automation Home (see page 3)] [Objects (see page 83)]

Applies To

- Marker (see page 100) object

Description Gets or sets the marker's time position, in seconds, relative to the trigger.

```
' Display the marker time position.
Dim myPosition As Double
myPosition = myMarker.Position
MsgBox Str(myPosition)

' Set the marker time position.
myPosition = -30e-9
myMarker.Position = myPosition
```

VB Syntax object.Position [=Time]

Parameters	Definition
object	An expression that evaluates to a Marker (see page 100) object.
Time	A **Double** value that is the marker's time position, in seconds, relative to the trigger.

Remarks The Position property has the Double type.

Position Property (of VbaViewChartLegend)

[Automation Home (see page 3)] [Objects (see page 83)]

Applies To

- VbaViewChartLegend (see page 134) object

Description

Gets or sets the chart legend position.

VB Syntax

object.Position [=Position]

Parameters	Definition
object	An expression that evaluates to a VbaViewChartLegend (see page 134) object.
Position	An **AgtLegendPosition** enumerated type value that can be one of the values described below.

Remarks

The LegendPosition property can have the following values:

AgtLegendPosition	Enum Value	Description
AgtLegendPositionBottom	1	
AgtLegendPositionLeft	2	
AgtLegendPositionRight	3	
AgtLegendPositionTop	4	

Probes Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 111)]

Applies To

- Instrument (see page 98) object

Description

Gets a collection of all currently defined probes.

VB Syntax

object.Probes

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.

Remarks

The Probes property has the Probes (see page 111) collection object type. Each item in the collection is a Probe (see page 111) object.

When this property is called, a snapshot of the currently defined probes are returned. If probes are subsequently added or deleted, this property must be called again to get an updated snapshot.

Reference Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 87)]

Applies To

- BusSignalDifference (see page 86) object

Description

Gets the reference buffer value associated with the bus/signal difference.

VB Syntax

object.Reference

Parameters	Definition
object	An expression that evaluates to a BusSignalDifference (see page 86) object.

Remarks The Reference property has the String type.

The value is in base hex, for example: "FF".

RemoteComputerName Property

[Automation Home (see page 3)] [Objects (see page 83)]

Applies To

- Instrument (see page 98) object

Description Gets or sets the remote computer name.

```
' Display the remote user computer name.
Dim myRemoteComputerName As String
myRemoteComputerName = myInst.RemoteComputerName
MsgBox Str(myRemoteComputerName)

' Set the remote user computer name.
myRemoteComputerName = "myComputer"
myInst.RemoteComputerName = myRemoteComputerName
```

VB Syntax object.RemoteComputerName [=RemoteComputerName]

Parameters	Definition
object	An expression that evaluates to a Instrument (see page 98) object.
RemoteComputerName	A **String** value that is the name of the remote computer.

Remarks The RemoteComputerName property has the String type.

RemoteUserName Property

[Automation Home (see page 3)] [Objects (see page 83)]

Applies To

- Instrument (see page 98) object

Description Gets or sets the remote user login name.

```
' Display the remote user login name.
Dim myRemoteUserName As String
myRemoteUserName = myInst.RemoteUserName
MsgBox Str(myRemoteUserName)

' Set the remote user login name.
myRemoteUserName = "myLogin"
myInst.RemoteUserName = myRemoteUserName
```

VB Syntax object.RemoteUserName [=RemoteUserName]

Parameters	Definition
object	An expression that evaluates to a Instrument (see page 98) object.
RemoteUserName	A **String** value that is the login name of the remote user.

Remarks The RemoteUserName property has the String type.

RunningStatus Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Module (see page 105) object

Description Gets the detailed running status of the module. Call this method when the Status (see page 236) property returns "Running" to get a more detailed running status.

VB Syntax object.RunningStatus

Parameters	Definition
object	An expression that evaluates to a Module (see page 105) object.

Remarks The RunningStatus property has the String type. The string returned is based on the object types defined below.

Object	Description
Module (see page 105)	Running - the module is running Stopped - the module has stopped running Initializing - the module is initializing or calibrating Waiting - the module is waiting for an event SelfTest - the instrument is running SelfTest

See Also

- Status (see page 236) property

SampleDifferences Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 87)]

Applies To

- CompareWindow (see page 95) object

Description Gets a collection of all the samples with differences found in the last comparison.

VB Syntax object.SampleDifferences

Parameters	Definition
object	An expression that evaluates to a CompareWindow (see page 95) object.

Remarks The SampleDifferences property has the SampleDifferences (see page 125) collection object type. Each item in the collection is a SampleDifference (see page 125) object.

When this property is called, a snapshot of the current differences are returned. If another compare is executed, this property must be called again to get an updated snapshot.

SampleNum Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- SampleDifference (see page 125) object

Description

Gets the sample number at which differences occurred.

VB Syntax

object.SampleNum

Parameters	Definition
object	An expression that evaluates to a SampleDifferences (see page 125) object.

Remarks

The SampleNum property has the Long type.

SelfTest Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 125)]

Applies To

- Instrument (see page 98) object

Description

Gets the SelfTest object.

VB Syntax

object.SelfTest

Parameters	Definition
object	An expression that evaluates to a Instrument (see page 98) object.

Remarks

The SelfTest property has the SelfTest (see page 125) object type.

See Also

- SelfTest (see page 125) object

Setup Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 39)]

Applies To

- AnalyzerModule (see page 84) object

Description

Gets or sets the logic analyzer's "XML-format" (in the online help) setup specification.

```
' Display the logic analyzer setup specification.
Dim mySetup As String
mySetup = myInst.GetModuleByName("My 1690A-1").Setup
MsgBox mySetup

' Set the logic analyzer setup specification.
myInst.GetModuleByName("My 1690A-1").Setup = mySetup
```

VB Syntax

object.Setup [=XMLSetupSpec]

Parameters	Definition
object	An expression that evaluates to an AnalyzerModule (see page 84) object.
XMLSetupSpec	A **String** containing the "XML format" (in the online help)"<Module> element" (in the online help) information.

Remarks The Setup property has the String type.

Size Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

Applies To

- VbaViewChartFont (see page 134) object

Description Gets or sets the text size.

VB Syntax object.Size [=Size]

Parameters	Definition
object	An expression that evaluates to a VbaViewChartFont (see page 134) object.
Size	A **Long** value that specifies the text size in points.

Remarks The Size property has the Long type.

Slot Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Module (see page 105) object

Description Gets the module's slot location in the frame (see the Frame (see page 222) property). If the module is comprised of a single card, the letter corresponding to the slot is returned. Possible values are "A" through "F". If the module is comprised of a multi-card set, a string identifying all slots occupied by the module, highlighting the master card slot, is returned. Format: "<starting slot>-<ending slot>[m=<master slot>]". Example: "A-C[m=B]".

VB Syntax object.Slot

Parameters	Definition
object	An expression that evaluates to a Module (see page 105) object.

Remarks The Slot property has the String type.

See Also

- Frame (see page 97) object
- Frames (see page 98) object

StartSample Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- SampleBusSignalData (see page 114) object

Description Gets the data's starting sample number relative to trigger.

VB Syntax object.StartSample

Parameters	Definition
object	An expression that evaluates to an SampleBusSignalData (see page 114) object.

Remarks The StartSample property has the Long type.

The starting sample number is relative to trigger; therefore, a starting sample number equal to -1024 means the trigger is at sample 0, 1024 samples after the starting sample.

See Also
- EndSample (see page 221) property

StartTime Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To
- SampleBusSignalData (see page 114) object

Description Gets the data's starting time (in seconds) relative to trigger.

VB Syntax object.StartTime

Parameters	Definition
object	An expression that evaluates to an SampleBusSignalData (see page 114) object.

Remarks The StartTime property has the Double type.

The starting time is relative to trigger and can therefore be a negative number.

See Also
- EndTime (see page 221) property

Status Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To
- Instrument (see page 98) object
- Module (see page 105) object

Description Gets the run status. The Instrument object's Status property returns the run status of all data acquisition modules (that is, not pattern generator modules), tools, and windows. The Module object's Status property only returns the run status of that specific module.

NOTE

Instead of polling the **Status** property in a loop, use the object's **WaitComplete** (see page 200) method to wait for a measurement to complete.

When a module is running repetitively, either "Stopped" or "Running" can be returned based on the current state of the module. Use the Instrument object's Status property which will always return "Running" during a repetitive run.

VB Syntax object.Status

Parameters	Definition
object	An expression that evaluates to one of the objects in the "Applies to" list above.

Remarks The Status property has the String type. The string returned is based on the object types defined below.

Object	Description
Instrument (see page 98)	Running - at least one of the data acquisition modules, tools, or windows is running Stopped - data acquisition modules, tools, or windows have stopped running
Module (see page 105)	Running - the module is running Stopped - the module has stopped running

See Also
- RunningStatus (see page 233) property

StatusMsg Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To
- Module (see page 105) object

Description Gets the module's verbose status message.

VB Syntax object.StatusMsg

Parameters	Definition
object	An expression that evaluates to a Module (see page 105) object.

Return Value A String containing the verbose status message.

NOTE This message is not guaranteed to be static and, therefore, should not be parsed. Use only for display purposes.

If you want to know the specific status of a module, see the RunningStatus (see page 233) or Status (see page 236) properties.

See Also
- RunningStatus (see page 233) property
- Status (see page 236) property

SubrowFound Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To
- FindResult (see page 97) object

Description Gets a Long containing the subrow number if the data sample contains subrows.

VB Syntax object.SubrowFound

Parameters	Definition
object	An expression that evaluates to a FindResult (see page 97) object.

Remarks The SubrowFound property has the Long type.

Symbols Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- BusSignal (see page 85) object

Description

Gets or sets the symbols associated with a bus/signal.

```
' Display a bus/signal's symbols.
Dim mySymbols As String
mySymbols = _
   myInst.GetModuleByName("My 1690A-1").BusSignals("My Bus 1").Symbols
MsgBox mySymbols

' Set a bus/signal's symbols.
mySymbols = "<Symbols><Symbol Name='My Symbol' Operator='Equals' " + _
   "Value='hFF'/></Symbols>"
myInst.GetModuleByName("My 1690A-1").BusSignals("My Bus 1").Symbols = _
   mySymbols
```

VB Syntax

object.Symbols [=XMLSymbols]

Parameters	Definition
object	An expression that evaluates to a BusSignal (see page 85) object.
XMLSymbols	A **String** containing the "XML format" (in the online help)"<Symbols> element" (in the online help) information.

Remarks

The Symbols property has the String type.

TargetControlPort Property

[Automation Home (see page 3)] [Objects (see page 83)]

Applies To

- Frame (see page 97) object

Description

Gets or sets the target control port value. The port is 8-bit TTL and can be used to remotely control switches on your device under test.

VB Syntax

object.TargetControlPort [=Value]

Parameters	Definition
object	An expression that evaluates to a Frame (see page 97) object.
Value	A **String** containing a port value. The value returned is the value present on the physical pins. The value can be set to a decimal, hexadecimal, octal, or binary number with optional don't care digits "x". The don't care digit is used to indicate that the value will stay the same (don't care). To specify a number base, use the following prefixes: ▪ h - for hexadecimal ▪ b - binary ▪ o - octal ▪ d - decimal For example: "hf", "b11110000", "bxxxx1xxx".

Remarks

The TargetControlPort property has the String type.

TextColor Property

[Automation Home (see page 3)] [Objects (see page 83)]

Applies To

- Marker (see page 100) object

Description

Gets or sets the marker text color.

```
' Display the marker text color.
Dim myTextColor As Long
myTextColor = myMarker.TextColor
MsgBox Str(myTextColor)

' Set the marker text color to red.
myTextColor = &H000000FF
myMarker.TextColor = myTextColor
```

VB Syntax

object.TextColor [=Color]

Parameters	Definition
object	An expression that evaluates to a Marker (see page 100) object.
Color	A **Long** value that represents the marker text color.

Remarks

The TextColor property has the Long type.

Color values have the following hexadecimal form: 0x00BBGGRR. The low-order byte (RR) contains a value for the relative intensity of red; the second byte (GG) contains a value for green; and the third byte (BB) contains a value for blue. The high-order byte must be zero. The maximum value for a single byte is &HFF. The color white is &H00FFFFFF, black is &H00000000, and red is &H000000FF.

TimeFound Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- FindResult (see page 97) object

Description

Gets a Double containing the time (in seconds) the event occurred in the data. You can call the GetDataByTime (see page 161) method with this value to get more details.

VB Syntax

object.TimeFound

Parameters	Definition
object	An expression that evaluates to a FindResult (see page 97) object.

Remarks

The TimeFound property has the Double type.

TimeFoundString Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- FindResult (see page 97) object

Description

Gets the time found as a string.

VB Syntax object.TimeFoundString

Parameters	Definition
object	An expression that evaluates to a FindResult (see page 97) object.

Remarks The TimeFoundString property has the String type.

Title Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

Applies To
- VbaViewChart (see page 132) object
- VbaViewChartAxis (see page 133) object

Description Gets the title of the chart or axis.

VB Syntax object.Title

Parameters	Definition
object	An expression that evaluates to one of the objects in the "Applies to" list above.

Remarks The Title property has the VbaViewChartTitle (see page 134) object type.

Tools Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 129)]

Applies To
- Instrument (see page 98) object

Description Gets a collection of all active software tools.

VB Syntax object.Tools

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.

Remarks The Tools property has the Tools (see page 129) collection object type. Each item in the collection is a Tool (see page 128) object.

When this property is called, a snapshot of the currently active tools are returned. If tools are subsequently added or deleted from the Overview, this property must be called again to get an updated snapshot.

Trigger Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 35)]

Applies To
- AnalyzerModule (see page 84) object

Description Gets or sets the logic analyzer's "XML-format" (in the online help) trigger specification.

```
' Display the logic analyzer trigger specification.
Dim myTrigger As String
myTrigger = myInst.GetModuleByName("My 1690A-1").Trigger
MsgBox myTrigger

' Set the logic analyzer trigger specification.
myInst.GetModuleByName("My 1690A-1").Trigger = myTrigger
```

VB Syntax object.Trigger [=XMLTriggerSpec]

Parameters	Definition
object	An expression that evaluates to an AnalyzerModule (see page 84) object.
XMLTriggerSpec	A **String** containing the "XML format" (in the online help)"<Trigger> element" (in the online help) information.

Remarks The Trigger property has the String type.

Type Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- BusSignalData (see page 86) object
- Module (see page 105) object
- Tool (see page 128) object
- Window (see page 136) object

Description Gets the BusSignalData (see page 86), Module (see page 105), Tool (see page 128), or Window (see page 136) object's type. The type can be used to identify sub-objects and their specific methods and properties.

VB Syntax object.Type

Parameters	Definition
object	An expression that evaluates to one of the objects in the "Applies to" list above.

Remarks The Type property has the String type.

The following tables show how types correspond to objects.

BusSignalData Type	BusSignalData Object
Sample	SampleBusSignalData (see page 114)

Module Type	Module Object
Analyzer	AnalyzerModule (see page 84)
ExternalScope	Module (see page 105)
Import	Module (see page 105)
Pattgen	PattgenModule (see page 106)

Window Type	Window Object
Compare	CompareWindow (see page 95)

Value Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 87)]

Applies To

- BusSignalDifference (see page 86) object

Description

Gets the data value associated with the bus/signal difference.

VB Syntax

object.Value

Parameters	Definition
object	An expression that evaluates to a BusSignalDifference (see page 86) object.

Remarks

The Value property has the String type.

The value is in base hex, for example: "FF".

VBAVersion Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Instrument (see page 98) object

Description

Gets the version number of VBA.

VB Syntax

object.VBAVersion

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.

Remarks

The VBAVersion property has the String type.

VBE Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Instrument (see page 98) object

Description

Gets the VBE extensibility object.

VB Syntax

object.VBE

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.

Remarks

The VBE property has the VBE object type.

Version Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example]

Applies To

- Instrument (see page 98) object

Description

Gets the version number of the system software.

VB Syntax

object.Version

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.

Remarks

The Version property has the String type.

The format of the version string is ##.##.#### (for example, "02.00.0000")

WebBrowser Property (for VbaViewWindow object)

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 136)]

Applies To

- VbaViewWindow (see page 135) object

Description

Gets the Web Browser view.

VB Syntax

object.WebBrowser

Parameters	Definition
object	An expression that evaluates to a VbaViewWindow (see page 135) object.

Remarks

The WebBrowser property has the VbaViewWebBrowser (see page 135) object type.

Requirements

- Version (see page 42): 3.20 or later.

WebBrowser Property (for VbaViewWebBrowser object)

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 135)]

Applies To

- VbaViewWebBrowser (see page 135) object

Description

Gets the contained IWebBrowser2 interface.

VB Syntax

object.WebBrowser

Parameters	Definition
object	An expression that evaluates to a VbaViewWebBrowser (see page 135) object.

Remarks

The WebBrowser property returns the interface to the contained Internet Explorer Control called IWebBrowser2. In Visual Basic, this can only be used if you create a reference to "Microsoft Internet Controls".

Requirements

- Version (see page 42): 3.20 or later.

Windows Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 137)]

Applies To

- Instrument (see page 98) object

Description

Gets a collection of all windows/viewers.

VB Syntax

object.Windows

Parameters	Definition
object	An expression that evaluates to an Instrument (see page 98) object.

Remarks

The Windows property has the Windows (see page 137) collection object type. Each item in the collection is a Window (see page 136) object.

When this property is called, a snapshot of the currently active windows are returned. If windows are subsequently added or deleted from the Overview, this property must be called again to get an updated snapshot.

_NewEnum Property

[Automation Home (see page 3)] [Objects (see page 83)] [Example (see page 245)]

Applies To

- BusSignalDifferences (see page 86) object
- BusSignals (see page 90) object
- Frames (see page 98) object
- Markers (see page 100) object
- Modules (see page 105) object
- Probes (see page 111) object
- SampleDifferences (see page 125) object
- Tools (see page 129) object
- Windows (see page 137) object

Description

References objects in a collection.

VB Syntax

object._NewEnum

Parameters	Definition
Object	With Visual C++, you can browse a collection to find a particular item by using the **_NewEnum** property or the Item (see page 224) property. In Visual Basic, you do not need to use the **_NewEnum** property because it is automatically used in the implementation of **For Each ... Next**.

Remarks

The _NewEnum property has the appropriate type of the object in the collection (BusSignalDifference (see page 86), BusSignal (see page 85), Frame (see page 97), Marker (see page 100), Module (see page 105), SampleDifference (see page 125), Tool (see page 128), or Window (see page 136)).

With Visual C++, you can browse a collection to find a particular item by using the _NewEnum property or the Item (see page 224) property. In Visual Basic, you do not need to use the _NewEnum property because it is automatically used in the implementation of For Each ... Next.

_NewEnum Example

This Visual Basic example uses the _NewEnum property to iterate through all buses/signals and display's their names.

Visual Basic

```
' Display all of the bus/signal names.
Dim myBusSignals As AgtLA.BusSignals
Set myBusSignals = myInst.GetModuleByName("My 1690A-1").BusSignals

Dim myBusSignalNames As String
Dim myBusSignal As AgtLA.BusSignal

For Each myBusSignal in myBusSignals
   ' Add the bus/signal name to the string.
   myBusSignalNames = myBusSignalNames + vbNewLine + myBusSignal.Name
Next
MsgBox "Bus/signal names: " + myBusSignalNames
```

Visual C++

```
//
//  This simple Visual C++ Console application demonstrates how to
//  use the Keysight 168x/169x/169xx COM interface to iterate through
//  all buses/signals and display their names.
//
//  This project was created in Visual C++ Developer.  To create a
//  similar project:
//
//    - Execute File -> New
//    - Select the Projects tab
//    - Select "Win32 Console Application"
//    - Select A "hello,World!" application (Visual Studio 6.0)
//
//  To make this buildable, you need to specify your "import" path
//  in stdafx.h (search for "TODO" in that file).  For example, add:
//  #import "C:/Program Files/Keysight Technologies/Logic Analyzer/LA \
//  COM Automation/agClientSvr.dll"
//
//  To run, you need to specify the host logic analyzer to connect
//  to (search for "TODO" below).
//

#include "stdafx.h"


////////////////////////////////////////////////////////////////////////
//
//  Forward declarations.
//
void DisplayError(_com_error& err);


////////////////////////////////////////////////////////////////////////
//
//  main() entry point.
//
int main(int argc, char* argv[])
{
   printf("*** Main()\n");
```

```
   //
   //  Initialize the Microsoft COM/ActiveX library.
   //
   HRESULT hr = CoInitialize(0);

   if (SUCCEEDED(hr))
   {
      try {   // Catch any unexpected run-time errors.
         _bstr_t hostname = "mtx33";   // TODO, use your logic
                                       // analysis system hostname.
         printf("Connecting to instrument '%s'\n", (char*) hostname);

         // Create the connect object and get the instrument object.
         AgtLA::IConnectPtr pConnect =
               AgtLA::IConnectPtr(__uuidof(AgtLA::Connect));
         AgtLA::IInstrumentPtr pInst =
               pConnect->GetInstrument(hostname);

         // Load the configuration file.
         _bstr_t configFile = "C:\\LA\\Configs\\config.ala";
         printf("Loading the config file '%s'\n", (char*) configFile);
         pInst->Open(configFile, FALSE, "", TRUE);

         // Display all of the bus/signal names.
         _bstr_t moduleName = "MPC860 Demo Board";
         _bstr_t busSignal;

         AgtLA::IAnalyzerModulePtr pAnalyzer =
               pInst->GetModuleByName(moduleName);
         AgtLA::IBusSignalsPtr pBusSignals = pAnalyzer->GetBusSignals();

         for (long i = 0; i < pBusSignals->GetCount(); i++)
         {
            busSignal = pBusSignals->GetItem(i)->GetName();
            printf("Bus/signal name '%s'.\n", (char*) busSignal);
         }
      }
      catch (_com_error& e) {
         DisplayError(e);
      }

      // Uninitialize the Microsoft COM/ActiveX library.
      CoUninitialize();
   }
   else
   {
      printf("CoInitialize failed\n");
   }

   return 0;
}


////////////////////////////////////////////////////////////////////
//
//  Displays the last error -- used to show the last exception
```

```
//  information.
//
void DisplayError(_com_error& error)
{
   printf("*** DisplayError()\n");

   printf("Fatal Unexpected Error:\n");
   printf("  Error Number = %08lx\n", error.Error());

   static char errorStr[1024];
   _bstr_t desc = error.Description();

   if (desc.length() == 0)
   {
      // Don't have a description string.
      strcpy(errorStr, error.ErrorMessage());
      int nLen = lstrlen(errorStr);

      // Remove funny carriage return ctrl<M>.
      if (nLen > 2 && (errorStr[nLen - 2] == 0xd))
      {
         errorStr[nLen - 2] = '\0';
      }
   }
   else
   {
      strcpy(errorStr, desc);
   }

   printf("  Error Message = %s\n", (char*) errorStr);
}
```

5 What's Changed

- You do not need to perform manual configurations now for COM Automation such as configuring Firewall settings.
- The HDMIModule object and its methods have been removed.
- The method VBARunRPICommand is no longer supported.

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