Manual Organization

The ICS Manual is divided into two sections. The sections are:

Installation and Getting Started
The Installation and Getting Started manual provides basic information to Install, Configure, and begin running the ICS software. This is the place to begin learning how to use the ICS environment.

Technical Reference
The Technical Reference Manual provides detailed information regarding the components of ICS.

What's New for ICS version 3.5.1

- Agilent 4155-6C driver support including Quasi Static CV
- Agilent 4192 driver support
- Enhanced the HP4156 driver to allow the user to store and use setups from the memory locations
- Enhance the HP4156 driver to allow the user to disable the display for faster speed

What's New for ICS version 3.5.2

- Windows 2000 Support
- Agilent 4155-6C driver support of FLEX command mode. Supported functions are:

Single Point Measurements
Sweep (VAR1) Measurements (pulsed and non-pulsed)
Sync (VAR1') Measurements (pulsed and non-pulsed)

- New Help Manuals with Search function
- Switch installation location changed to allow ICS and Switch to work together without I/CV.

Metrics Codewords

Metrics Technology software products use a combination of a Security Key and Codeword. The unique combination of a Codeword and Security Key allows the software product to be run.

The Software Codeword Certificate

The Codeword is found on the Software Codeword Certificate included in the packaging. There will be a certificate for each software component ordered. The certificate is made up of two (2) parts, the Registration Information and Codeword Information.

The Registration Information

We encourage all customers to register their software with Metrics Technology. Only registered users will receive technical support for their products.

Note: Only one user may be registered per copy of software. This person is the only person that will receive support.

Customer ID

The Customer ID is a number that has the form IAXXXXXA. Where the X is a number. Variations include IHXXXXA, MHXXXXXA, and MKXXXXXA. This number must match the number on the Security Key.

Product Desc

This is the Product Description. This will be the name of the product, such as Metrics I/CV or Metrics ICS.

Product ID

The product ID is a second description of the software.

Version

This is the version of the software.

Note: The version number and the codeword are matched. Thus, customers who have not purchased an upgrade will not be able to run it without purchasing the correct codeword.

Codeword Serial

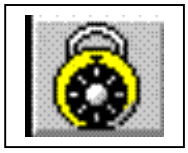
This is the codeword for the software. During installation you are prompted to enter this number. You must enter it exactly as it is printed on the certificate, including the hyphens. i.e. 111-111-1-1111111

Re-Entering the Code Words

The software codewords can be re-entered in one of two different ways, either by re-installing the ICS software according the instructions above or by re-entering the codeword in each application seperately.

To re-enter ICS code word:

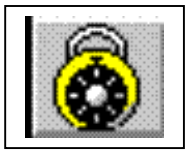
1. Open the ICS program.
2. Click on the Codeword button.



3. Enter the code word supplied on the product registration form.
4. Click the **OK** button.

To re-enter the Metrics Switch code word:

1. Open the Metrics Switch program.
2. Click on the Codeword button.



3. Enter the code word supplied on the product registration form.
4. Click the **OK** button.

ICS Installation Notes

The installation of the Metrics Technology ICS software is a quick and simple process. This manual will discuss the steps required for successful installation and configuration of the software.

The process described is the exact set of steps performed by Metrics Technology engineers when servicing systems. Please follow all steps in the order presented for a successful installation.

Step 1: A Checklist

The first step to installing the ICS software is to verify that you have all of the equipment and software required. By gathering the necessary pieces before starting, the process can be much easier. Please verify each of the items listed:

Computer

- Pentium 200 MHz or better (or equivalent)
- Windows 95, 98, or Windows NT
- Service Pack 3 or 5 for Windows NT
- 64 M RAM for Windows 95 or 98; 128 M RAM for Windows NT or 2000
- CD-ROM Drive
- Internet Explorer 5.0 or better

GPIB Board

- Board
- Software for Windows NT, 98, or 2000

ICS Software

- CD-ROM containing ICS
- Security Key and Codeword

Step 2: Installation

After verifying your system components, it is time to begin installing them. The following list of items should be installed in the order presented.

Install GPIB Board

Install the GPIB board according to the instructions provided by the manufacturer.

Note!

Make sure that the device names are not changed from the default names. In addition verify that the board is setup to be the System Controller.

Install ICS Software

1. Install the Security Key on the LPT port of the computer.

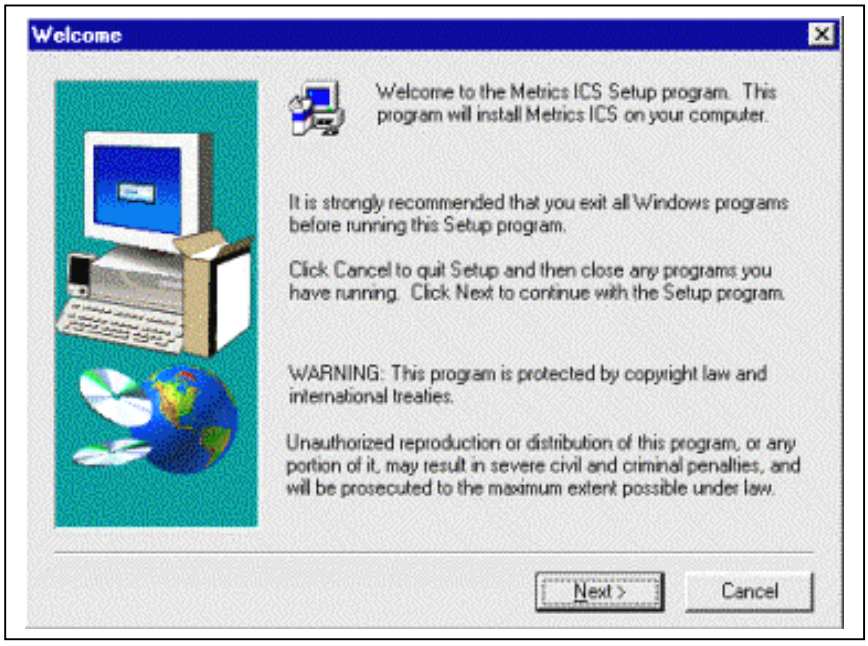
2. Insert the ICS CD-ROM into your CD Drive. The CD should automatically start and open the installation menu as shown below. **Note:** If this does not occur, click the Windows "Start" button and click "Run". Type in the following:

X:\demo32.exe mics35.dbd

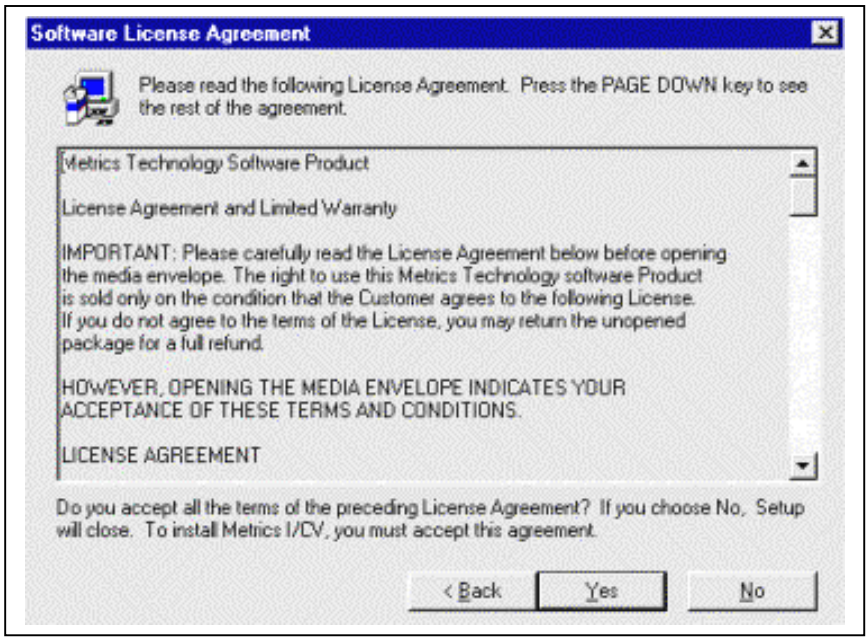
Where X is the CD-ROM drive letter. Click the "OK" button.

3. Click the "Install Products" button to begin the installation process. This will open a different page of the installation menu.

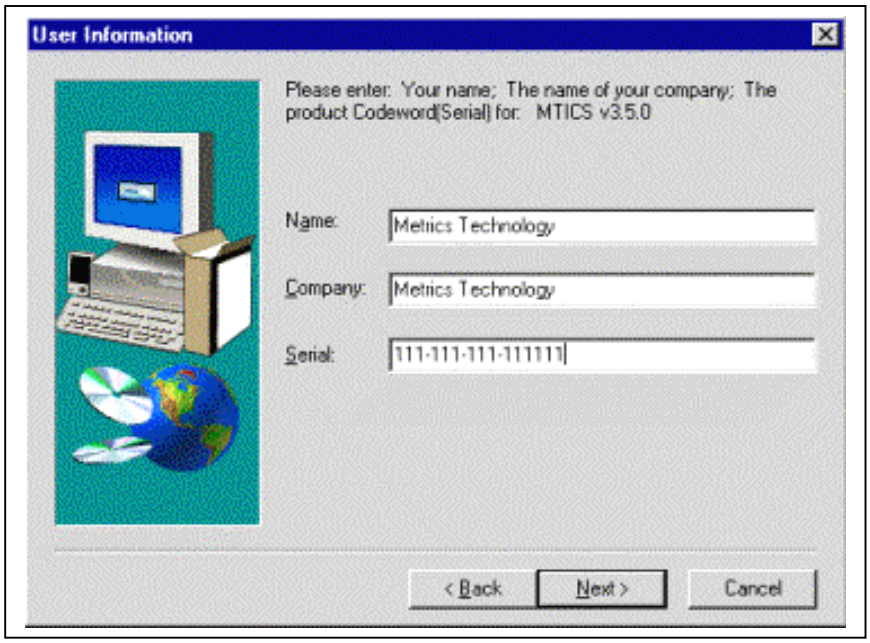
4. Select the "Install Metrics ICS" button to install the software. This will automatically install Metrics ICS.



5. The Welcome Window will open and remind you to exit all other Windows programs. To continue, click the "Next" button.



6. Please read the software license agreement and click the "Yes" button to accept the terms of the license.



7. Enter the Codeword for the Metrics ICS software.

Note!

Make sure that you enter the codeword that corresponds to the software component being installed.

Note!

Please verify that the codeword is entered with all of the hyphens (-) included.

8. Follow the instructions to complete the installation.

After completing the installation of ICS proceed to the next section of this manual, Configuring Metrics ICS.

Switch Installation Notes

Note: The Metrics Switch software is an option for the Metrics ICS software. These instructions only apply for customers that purchased the Metrics Switch software.
The installation of the Metrics Technology Switch software is a quick and simple process. This manual will discuss the steps required for successful installation and configuration of the software.
The process described is the exact set of steps performed by Metrics Technology engineers when servicing systems. Please follow all steps in the order presented for a successful installation.

Step 1: A Checklist

The first step to installing the Switch software is to verify that you have all of the equipment and software required. By gathering the necessary pieces before starting, the process can be much easier. Please verify each of the items listed:

Computer
- Pentium 200 MHz or better (or equivalent)
- Windows 98, NT, or 2000
- Service Pack 3 or 5 for Windows NT
- 64 M RAM for Windows 98; 128 M RAM for Windows NT or 2000
- CD-ROM Drive
- Internet Explorer 5.0 or better

GPIB Board
- Board
- Software for Windows NT, 98, or 2000

Switch Software
- CD-ROM containing Switch
- Security Key and Codeword

Step 2: Installation

After verifying your system components, it is time to begin installing them. The following list of items should be installed in the order presented.

Install GPIB Board

1. Install the GPIB board according to the instructions provided by the manufacturer.

Note!
Make sure that the device names are not changed from the default names. In addition verify that the board is setup to be the System Controller.

Note!
Some systems have had the GPIB card changed from one brand to another. Often the GPIB software has not been completely removed for the old card. This can cause ICS to mistake the GPIB card. Please make sure that all software from other GPIB boards that are not installed in the computer has been removed.

Install Switch Software

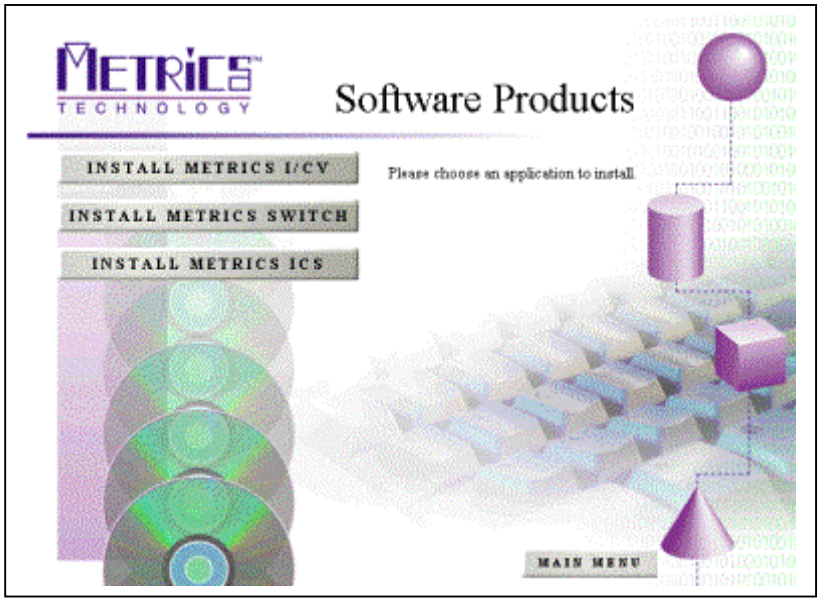
2. Install the Security Key on the LPT port of the computer.

3. Insert the Switch CD-ROM into your CD Drive. The CD should automatically start and open the installation menu as shown below. **Note:** If this does not occur, click the Windows "Start" button and click "Run". Type in the following:

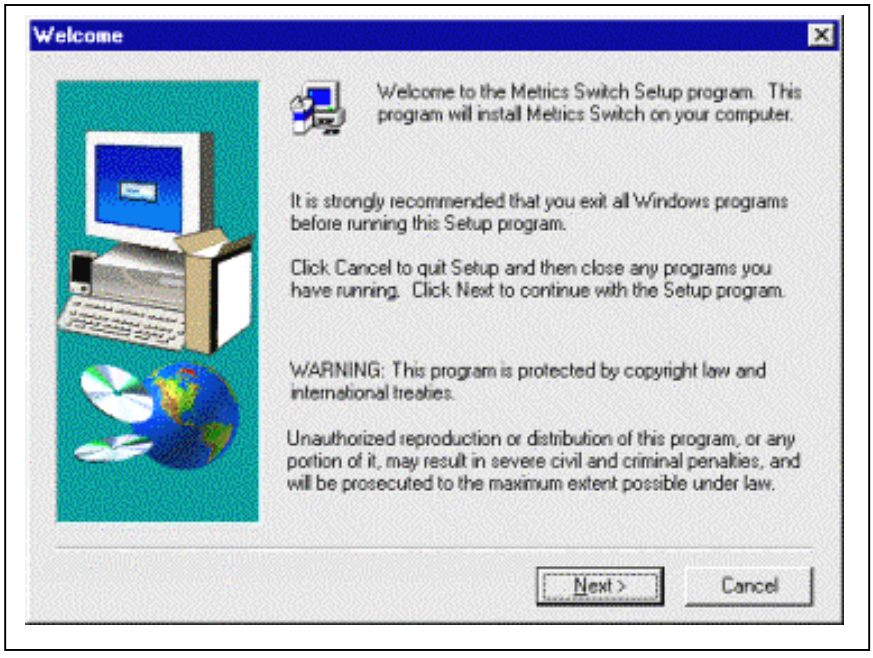
X:\demo32.exe mics35.dbd

Where X is the CD-ROM drive letter. Click the "OK" button.

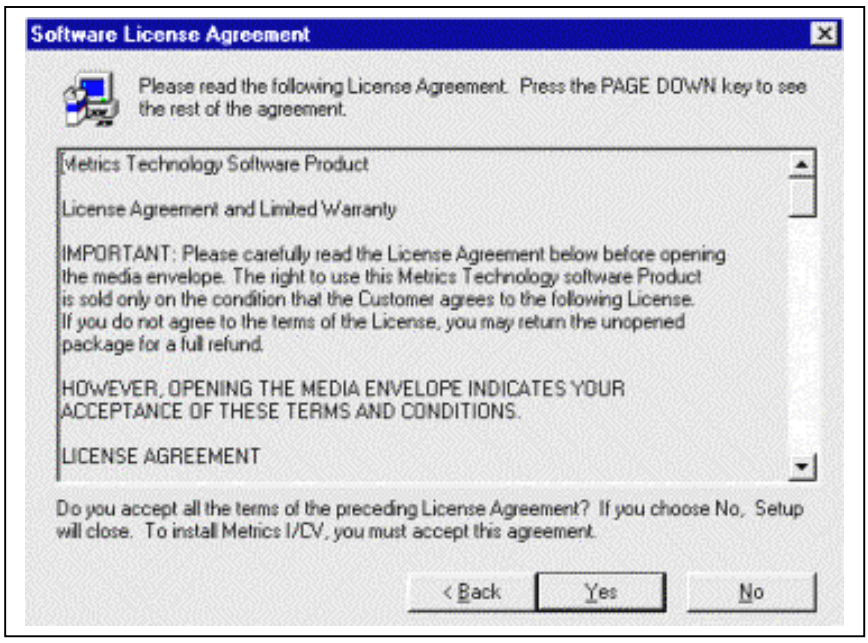
4. Click the "Install Products" button to begin the installation process. This will open a different page of the installation menu.



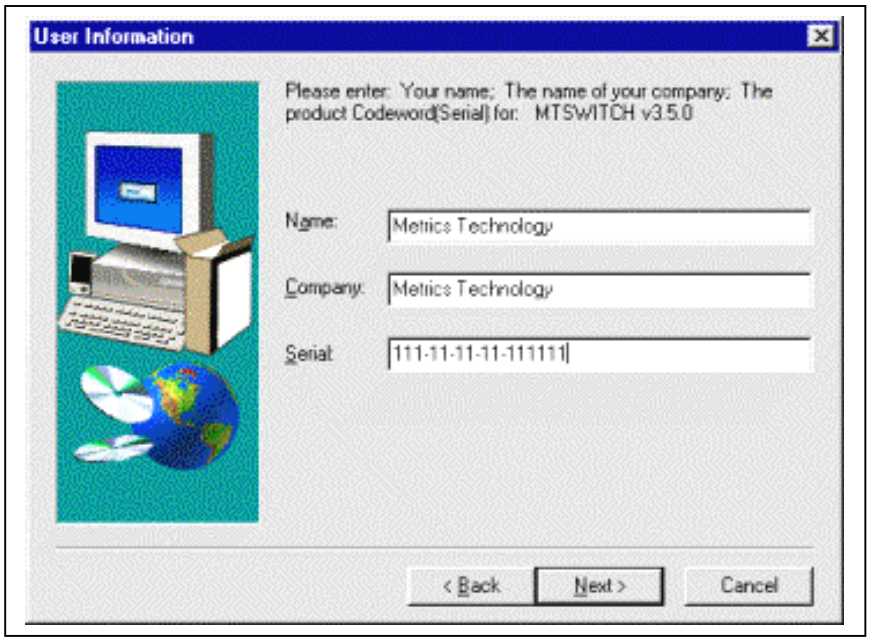
5. Select the "Install Metrics Switch" button to install the software. This will automatically install Metrics Switch.



6. The Welcome Window will open and remind you to exit all other Windows programs. To continue, click the "Next" button.



7. Please read the software license agreement and click the "Yes" button to accept the terms of the license.



8. Enter the Codeword for the Metrics Switch software.

Note!

Make sure that you enter the codeword that corresponds to the software component being installed.

Note!

Please verify that the codeword is entered with all of the hyphens (-) included.

9. Follow the instructions to complete the installation.

After completing the installation of Switch proceed to the next section of this manual, Configuring Metrics Switch.

ICS Configuration Notes

The configuration of the Metrics Technology ICS software is a simple process if you spend a few minutes of preparation before beginning. This manual will discuss the steps required for successful configuration of the software.
The process described is the exact set of steps performed by Metrics Technology engineers when servicing systems. Please follow all steps in the order presented for a successful installation.

Step 1: Determine Components

In this section we will decide what hardware components are being used with Metrics ICS and how they should be configured. There are two different components that we must evaluate. The components to be configured are the measurement instrumentation and the GPIB board. Each component is listed below with a series of questions. Write any requested information in the space provided. This information will be used later to set the Configuration.

GPIB Board

The Metrics ICS software will try to automatically detect the GPIB board installed. This is done by searching for characteristic .dll files used by the different boards. It has been noted that systems that have had several different GPIB boards installed tend to have the software still installed. This will confuse the ICS software and all files associated with a GPIB board that has been replaced should be removed. It is recommended that the latest version of the GPIB software be installed. Significantly older versions of GPIB software are not supported. Write the GPIB Board Manufacturer and name in the space provided below:

Manufacturer: _____

Name:_____

Instrumentation

The Metrics ICS software must be configured to know the address of each instrument installed connected. After this information has been stored by ICS, it will not have to be re-entered unless the physical configuration is changed. Write the Model Number and GPIB address of each instrument in the spaces below:

Instrument:_____

GPIB Address:_____

Instrument:_____

GPIB Address:_____

Instrument:_____

GPIB Address:_____

Instrument:_____

GPIB Address:_____

Instrument:_____

GPIB Address:_____

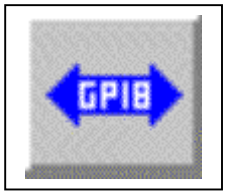
Instrument:_____

GPIB Address:_____

Step 2: Configure ICS

Now that all of the information for the system has been collected, the Metrics ICS software can be configured. To begin configuration, start the Metrics ICS Software by selecting:
Start → Programs → Metrics → ICS
At this point the software will start. If the software does not give any error messages about the Communications Software, then the GPIB has automatically detected and is configured. If not,

1. Click the "GPIB" button.



2. The Communications Setup Window will open and the "Sub-Type" must be selected.

Refer to the table below for the correct Sub-Type. Select and then click the "OK" button. At this point you will be returned to the ICS window.

GPIB Board Manufacturer Sub-Type Name

National Instruments	NI 32 Thunk
Hewlett-Packard	HP SICL 32 Thunk
Keithley	KI KPC32 Thunk

3. If you get an Error Message about the Communications software, it means that the GPIB software (provided by the GPIB board manufacturer) is not installed or its configuration is incorrect. Please refer to the GPIB Board's Installation Guide from the board manufacturer.

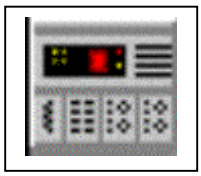
Note!

Make sure that the device names are not changed from the default names. In addition verify that the board is setup to be the System Controller.

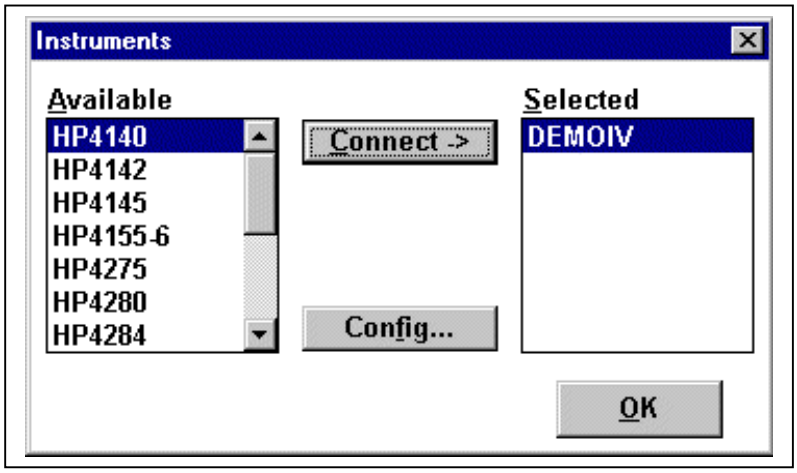
Note!

Some systems have had the GPIB card changed from one brand to another. Often the GPIB software has not been completely removed for the old card. This can cause ICS to mistake the GPIB card. Please make sure that all software from other GPIB boards that are not installed in the computer has been removed.

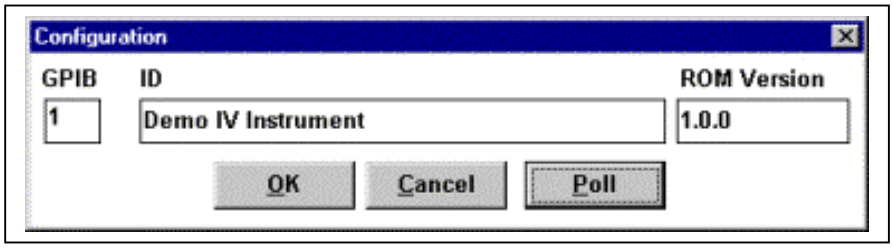
4. Click the "Select Instrument" button to load and configure the instrument driver.



5. Highlight the Instrument to be added and then click the "Connect" button. This will move the name to the column on the right side of the window. Highlight the instrument name and click the "Config" button.



6. Enter the GPIB Address and click the "Poll" button. This will make the software communicate with the instrument. If the communication works, control will be returned to ICS and the instrument is ready for use. Otherwise, the software will timeout on the communication and it will be necessary to check the GPIB cables and verify that any switches that must be set on the instrument are done so. Please refer to the Metrics ICS Reference Guide installed on your system when you install the Metrics Technology software. Refer to the section on your instrument.



Refer to the following Sections on Installing and Configuring Metrics Switch, if applicable.

Switch Configuration Notes

Note: The Metrics Switch software is an option for the Metrics ICS software. These instructions only apply for customers that purchased the Metrics Switch software.
The configuration of the Metrics Technology Switch software is a simple process if you spend a few minutes of preparation before beginning. This manual will discuss the steps required for successful configuration of the software.
The process described is the exact set of steps performed by Metrics Technology engineers when servicing systems. Please follow all steps in the order presented for a successful installation.

Step 1: Determine Components

In this section we will decide what hardware components are being used with Metrics Switch and how they should be configured. There are two different components that we must evaluate. The components to be configured are the measurement instrumentation and the GPIB board. Each component is listed below with a series of questions. Write any requested information in the space provided. This information will be used later to set the Configuration.

GPIB Board

The Metrics Switch software will try to automatically detect the GPIB board installed. This is done by searching for characteristic .dll files used by the different boards. It has been noted that systems that have had several different GPIB boards installed tend to have the software still installed. This will confuse the ICS software and all files associated with a GPIB board that has been replaced should be removed. It is recommended that the latest version of the GPIB software be installed. Significantly older versions of GPIB software are not supported. Write the GPIB Board Manufacturer and name in the space provided below:

Manufacturer: _____

Name: _____

Instrumentation

The Metrics Switch software must be configured to know the address of each switch connected. After this information has been stored by Switch, it will not have to be re-entered unless the physical configuration is changed. Write the Model Number and GPIB address of each switch matrix in the spaces below:

Switch: _____

GPIB Address: _____

Switch: _____

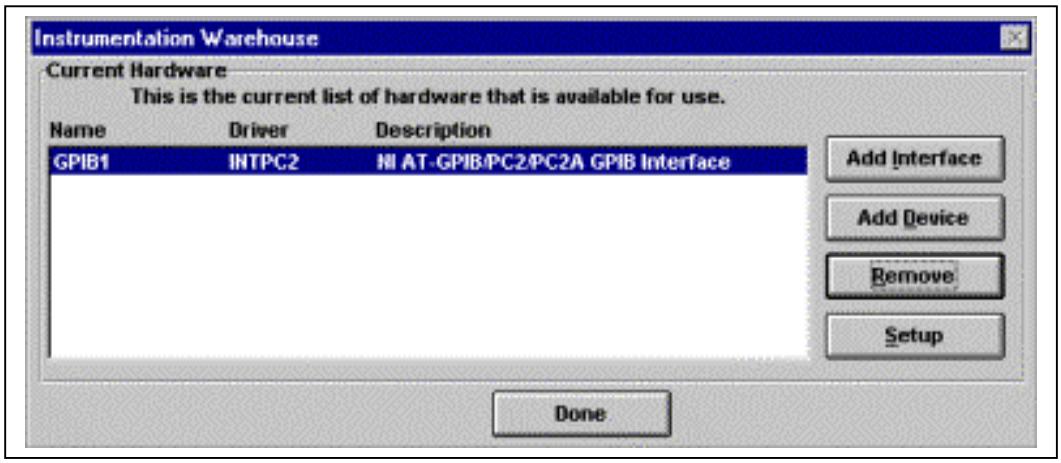
GPIB Address: _____

Step 2: Configure Switch

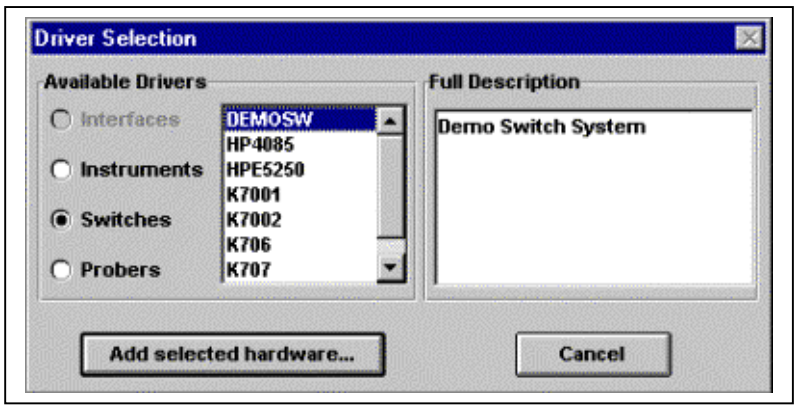
Now that all of the information for the system has been collected, the Metrics Switch software can be configured. To begin configuration, start the Metrics Switch Software by selecting:
Start -> Programs -> Metrics -> Switch
At this point the software will start. If the software does not give any error messages about the Communications Software, then the GPIB has automatically detected and is configured. If not,

1. Click the "Setup" button.

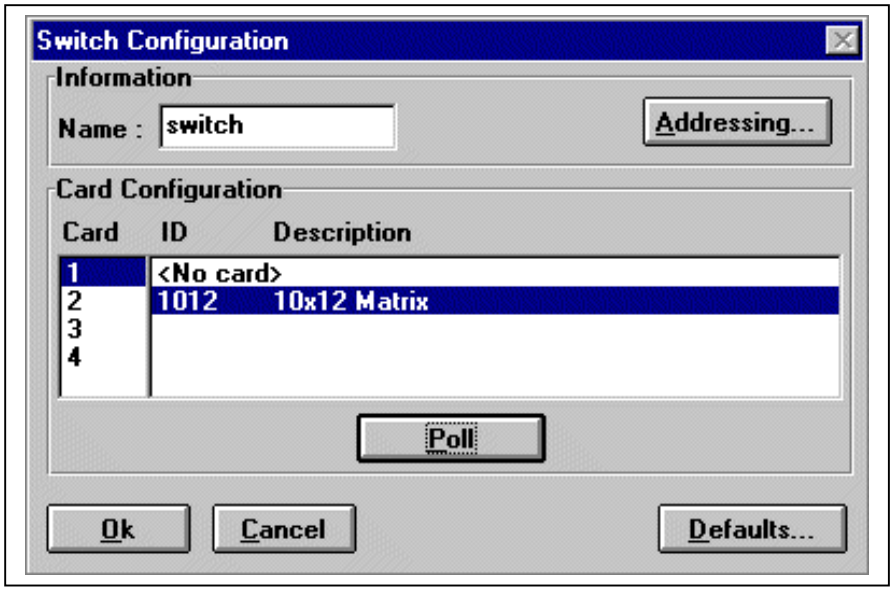
2. The Instrumentation Warehouse Window will open and the GPIB board will be displayed. The switch must be selected. Click the "Add Device" button. At this The Driver Selection Window will open.



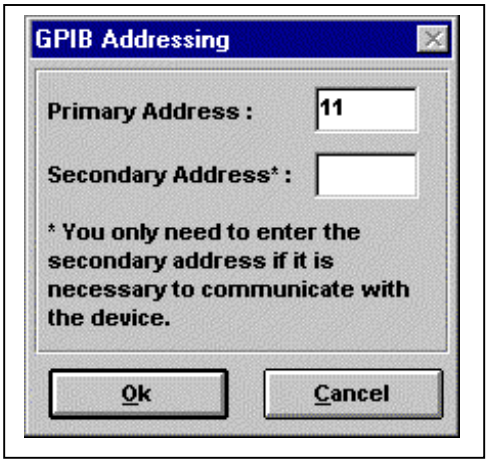
3. Select the Switches toggle and highlight the switch to be added.



4. Click the "Add Selected Hardware" button to load and configure the instrument driver.



5. Type in a Name for the Switch and then click the "Addressing.." button.



6. Enter the GPIB Address and click the "OK" button. Click the "Poll" button. This will make the software communicate with the instrument. If the communication works, control will be returned to Switch and the matrix is ready for use. Otherwise, the software will timeout on the communication and it will be necessary to check the GPIB cables and verify that any switches that must be set on the instrument are done so. Please refer to the Metrics Switch Reference Guide. A version of this is installed on your system when you install the Metrics Technology software. Please look in the Metrics\Manuals directory. It is written and saved in Microsoft Word 97 format. Refer to the section on your switch matrix.

Module 1- ICS Getting Started Guide

Introduction

The first Module of the Self-Paced Guide introduces the Metrics ICS software. The Module also provides important information on software versions and support.
Please note that each module builds upon the information presented in the previous Modules. It is recommended that the Guide is followed in the order presented.

Topics Covered

- What is Metrics ICS Software?
- Overview of Metrics ICS Software
- Updating Versions
- Support

What is Metrics I/CV Software?

The Metrics ICS Software is a Windows based environment designed for Semiconductor testing applications. Measurements for the characterization of devices can be created in a matter of minutes without programming.

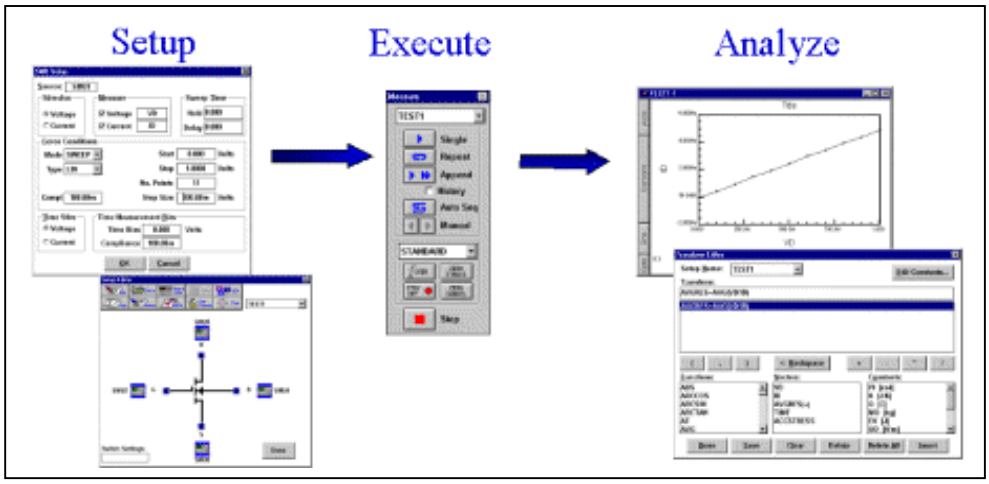
Metrics I/CV Controls:

- Semiconductor Parameter Analyzers
- C-V Meters
- Source Meters

Overview of Metrics ICS Software

Metrics ICS Software allows provides an environment for the collection of data in three steps: Setup, Execute, and Analyze. The Setup of a Measurement typically takes no more than 1-2 minutes.

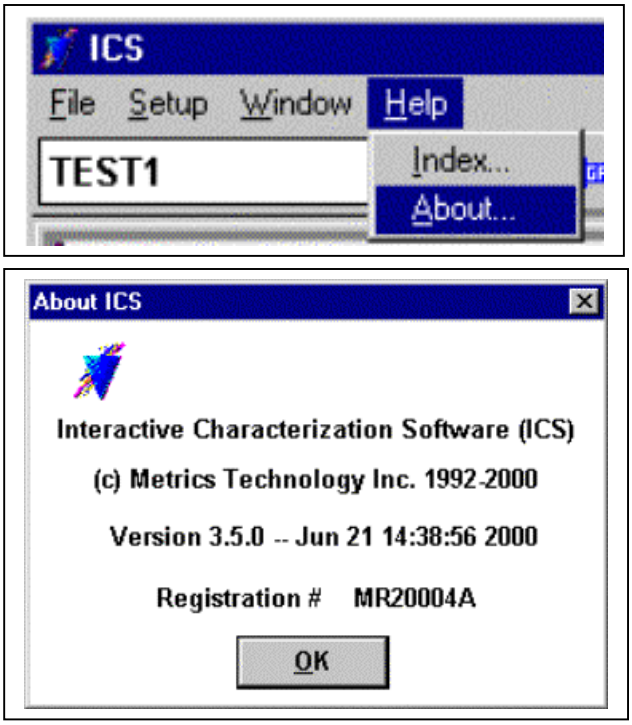
ICS supports several measurement modes to accommodate most testing methods.
The Analysis tools in ICS include plotting and data extraction. Once the functions are created, they can be saved with the data.



The beauty of ICS is that once a test is created and saved it can be re-opened and used again, including the analysis.

Determining Software Version

The software version and build date are very important when requesting support. Without this information it is impossible to provide efficient service. Please be prepared to provide this information when seeking support.



To determine the software version:

1. Open ICS.
2. Click the Help Menu item.
3. Click the About item.

Updating the Metrics ICS Software

Metrics Technology provides Service Patches to registered customers. Once a patch has been created and verified by Metrics Technology, it is placed on our web site (www.metricstech.com).

The patch can be downloaded from the web site. Please note the patches are very large and will take time to download depending upon your connection speed. Once downloaded the file is an .EXE application that requires a password to open. Please contact Metrics Technology support (support@metricstech.com) for the codeword. Please note that only registered customers will be provided the codeword.

Support

Metrics Technology provides support to customers whose software is within 2 versions of the current retail version.
All customers who request support must have registered their copy of ICS with Metrics Technology. The form is provided as part of the software package or you can visit the Metrics Technology web site and select the support link to access the registration forms.

Support is available from Metrics Technology

Contact Metrics Technology by:

1. Reviewing our web site.
2. Sending email to support@metricstech.com
3. Calling 505-761-9630

To receive Technical Support services you will need:

- Registration Number
- Version and Build Date
- Complete description of issue, including any error messages

Module 2- Selecting Instruments

Introduction

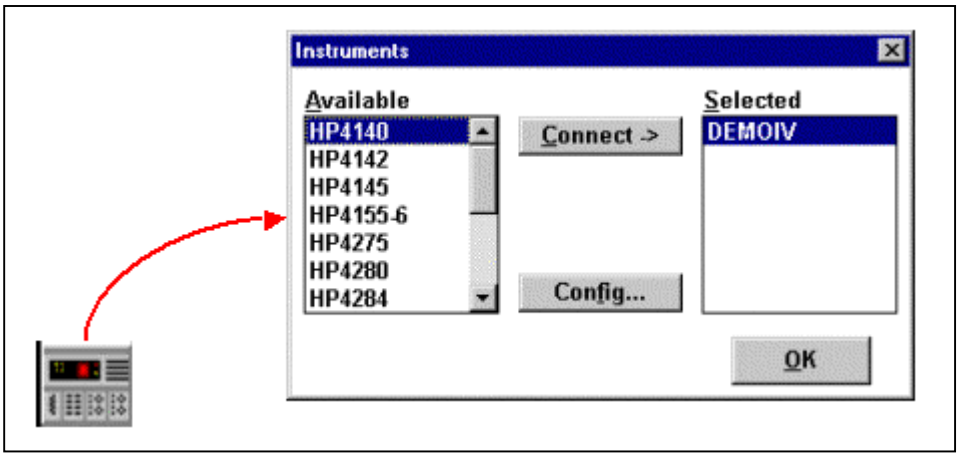
The Module introduces the Metrics ICS (Interactive Characterization Software) measurement engine and demonstrates how to create measurements with it.

Topics Covered:

- Selecting an Instrument
- Configuring the Instrument
- Polling an Instrument

Selecting an Instrument Driver

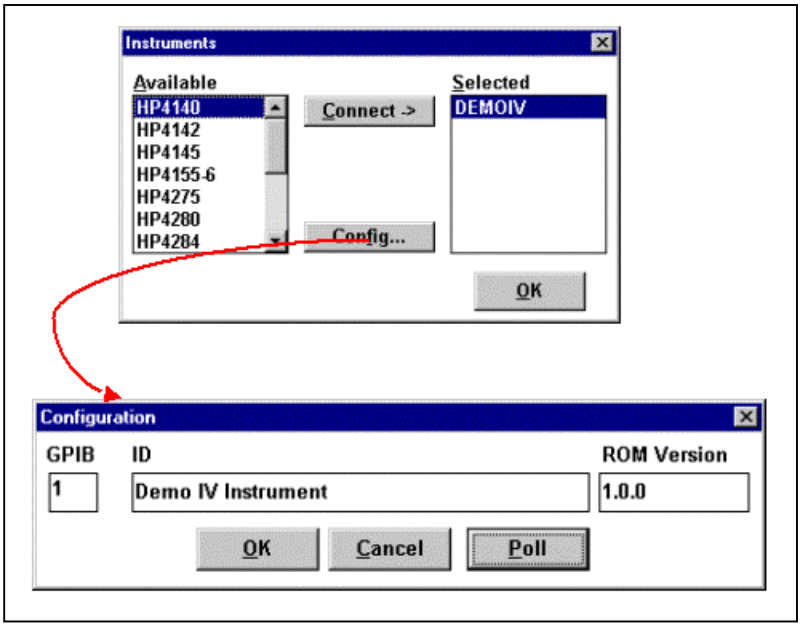
Before creating a measurement, ICS must know what instrument is being used. This is accomplished by configuring ICS. Once an instrument has been configured, ICS will remember this configuration. The only time ICS must be reconfigured is when the instrument is changed or the ICS35.INI file is erased.



1. Click the "Select Instrument" button.
2. Highlight the instrument to be added and click the "Connect" button.

Configuring the Instrument

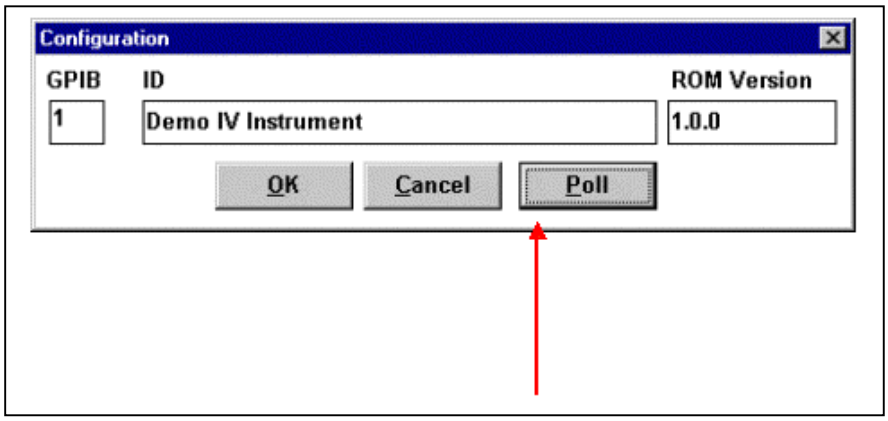
After the Instrument driver is selected, it must be configured.



1. Highlight the instrument to be configured and click the "Config" button.
2. Enter the GPIB address.

Polling an Instrument

To confirm that the instrument and ICS are communicating properly, poll the instrument.



1. Click the "Poll" button.
2. Click the "OK" button to close the Configuration window.
3. Click the "OK" button to close the Instruments window.

Module 3- Creating Measurements

Introduction

The Module introduces the Metrics ICS (Interactive Characterization Software) measurement engine and demonstrates how to create measurements with it. Special demonstration drivers have been created to allow the development to be independent of the instrument. For details about the instrument drivers provided with Metrics ICS, please refer to the Metrics ICS documentation. The steps to creating a test method will be covered.

Topics Covered

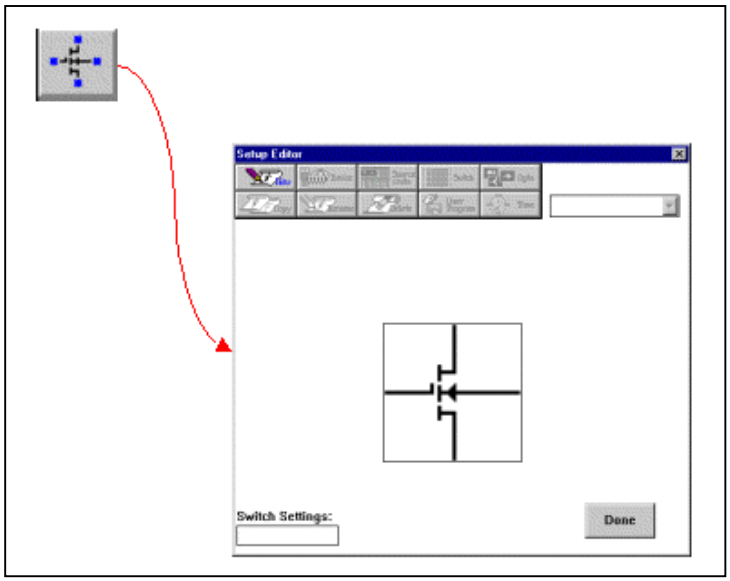
- Creating a Sweep Measurement
- Creating a Spot Measurement
- Creating a Time-Based Measurement

Create a Sweep Measurement

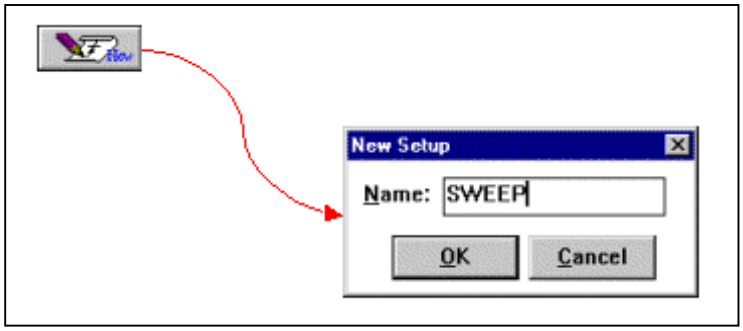
The following example demonstrates how to create a sweep measurement using ICS. This example uses the demonstration driver within ICS.

To Create a Sweep:

1. Open the setup editor.
The Setup Editor is the place in ICS where the measurement is configured. It can be opened by clicking the Setup Editor button.

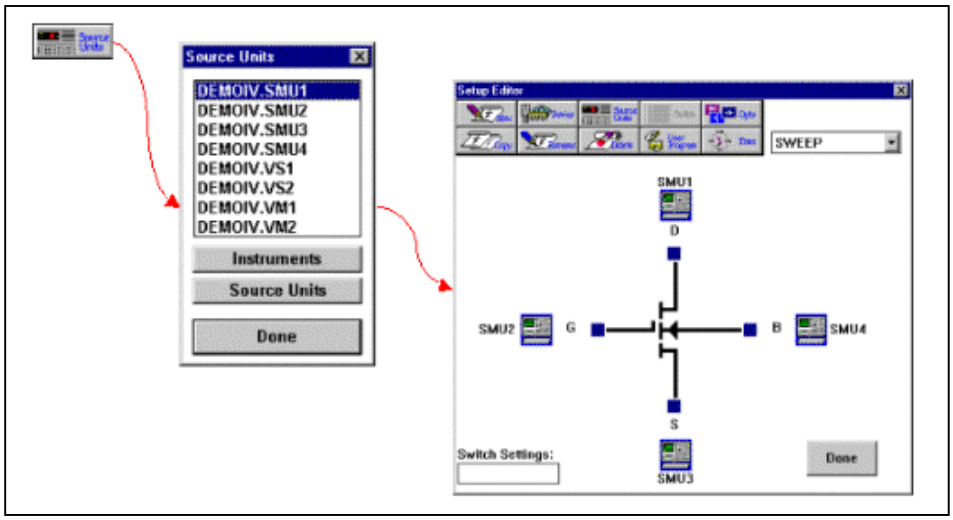


2. Name the Measurement Setup.
Each measurement must have a unique name. Before the measurement can be created, it must be given a name. To name the measurement:



a. Click the New button and type in a name.
b. Click the OK button after entering the name.

3. Select Source Units.
The source units correspond to the outputs of the instrument you are using. Metrics ICS provides a graphical way to document the connections for later reference. To add a source unit:



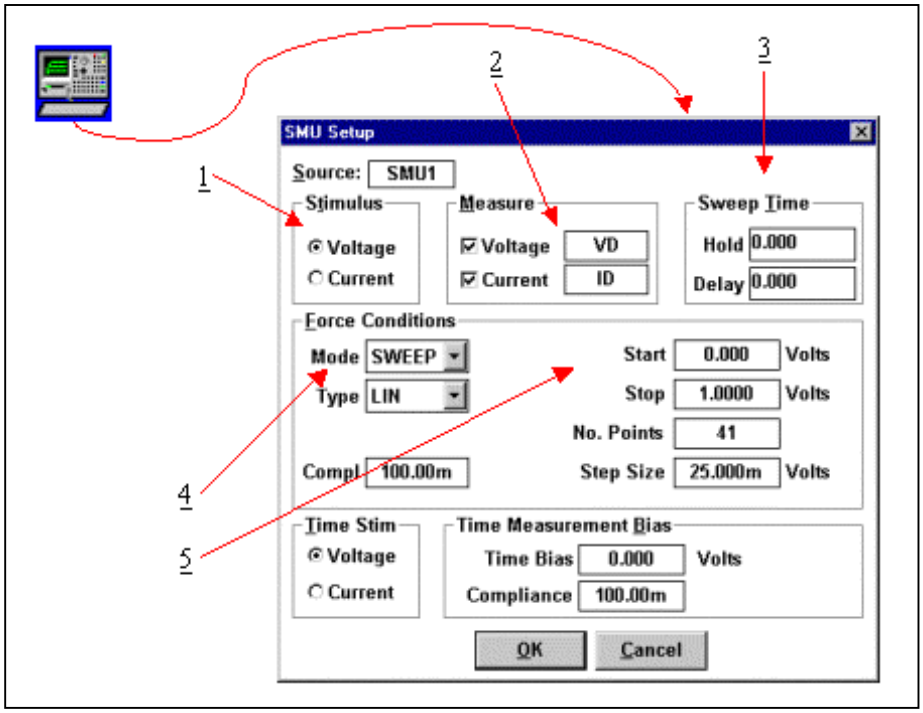
a. Click on the Source Units button to open the Source Units window.
b. Highlight the specific unit.
c. Click the blue box beside the device lead in the Setup Editor.

To remove a source unit:

a. Highlight the specific unit.
b. Click the blue box beside the device lead in the Setup Editor.
c. Click the Yes button.

Note: The graphic is merely a representation of the device. The software does not expect behaviors from the data. Thus, the pinout does not have to exactly match, rather it is only for reference.

4. Configure Source Units.
In this example we are creating a sweep source, so we must configure the source unit properly. To setup a sweep source:



1. Select the stimulus type.
2. Select the values to be measured (see note below).
3. Click the blue box beside the device lead in the Setup Editor.
4. Select the sweep timing (see note below).
5. Select the Source Mode. In this case we want it to be Sweep.
6. Setup the sweep parameters.

Note: Most SMU's can only measure the signal that is not being sourced. Therefore in this case we have selected the Stimulus to be Voltage resulting in the Current being measured. The values returned for Voltage in this case would be the calculated voltage steps. The opposite is true when the Stimulus mode is set to Current. The Sweep Time parameters are to control the rate of the sweep. Please note that these inputs vary for different instruments.

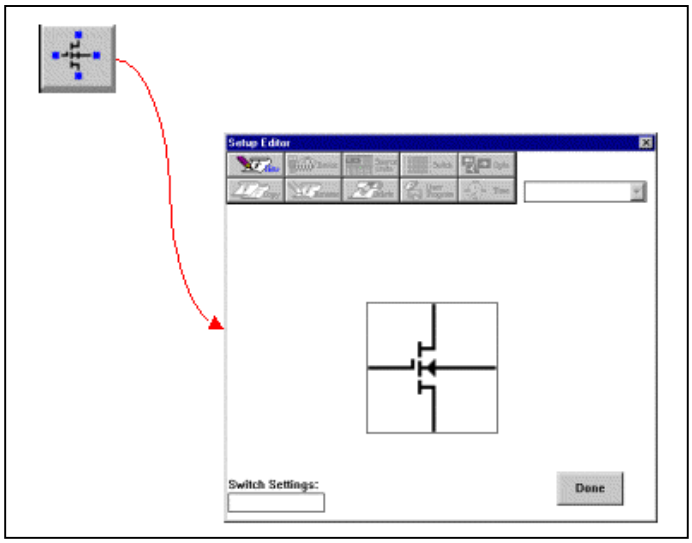
Create a Spot Measurement

In this example we will create a spot (or single point) measurement. Most of the steps are the same or similar to creating a sweep measurement. The first step is to open the setup editor. The setup editor can be opened by clicking the Setup Editor button.

To Create a Spot Measurement:

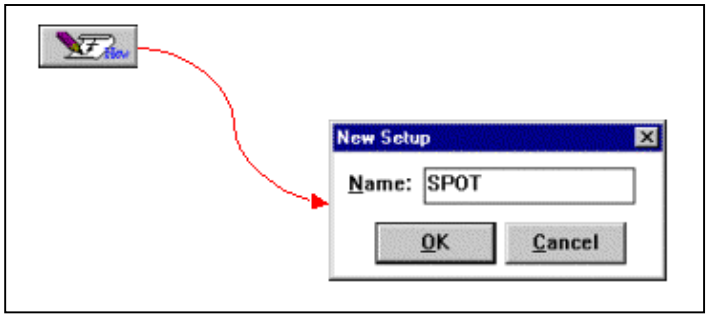
1. Open the setup editor.

The Setup Editor is the place in ICS where the measurement is configured. It can be opened by clicking the Setup Editor button.



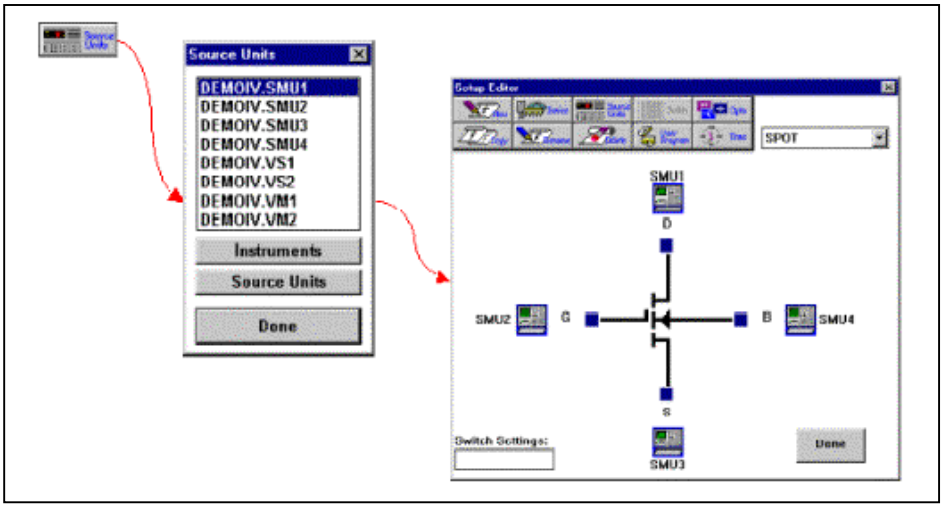
2. Name the Measurement Setup.

Each measurement must have a unique name. Before the measurement can be created, it must be given a name. To name the measurement:



a. Click the New button and type in a name.
b. Click the OK button after entering the name.
c. Select Source Units.

The source units correspond to the outputs of the instrument you are using. Metrics ICS provides a graphical way to document the connects for later reference. To add a source unit:



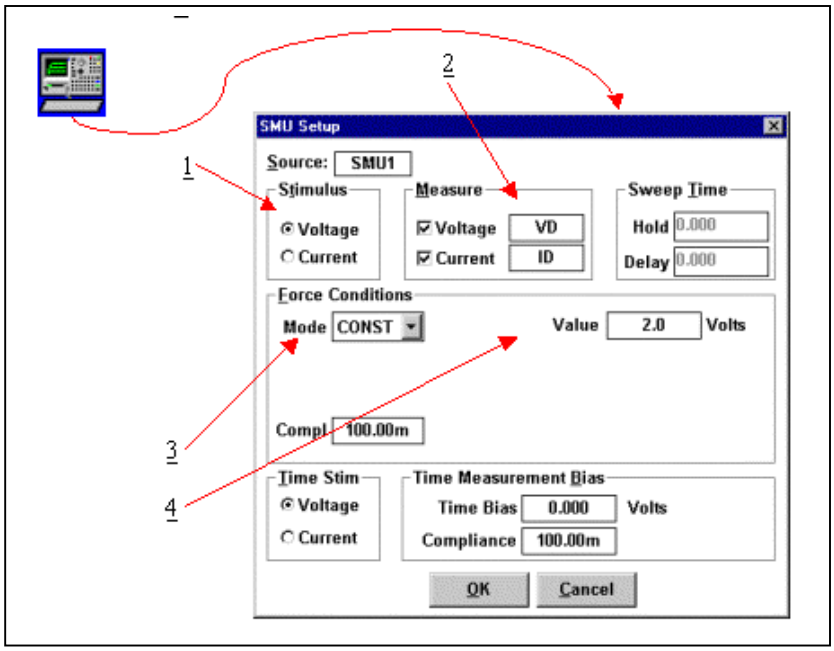
a. Click on the Source Units button to open the Source Units window.
b. Highlight the specific unit.
c. Click the blue box beside the device lead in the Setup Editor.

To remove a source unit:

a. Highlight the specific unit.
b. Click the blue box beside the device lead in the Setup Editor.
c. Click the Yes button.

Note: The graphic is merely a representation of the device. The software does not expect behaviors from the data. Thus, the pinout does not have to exactly match, rather it is only for reference.

3. Configure Source Units.
In this example we are creating a spot source, so we must configure the source unit properly. To setup a spot source:



1. Select the stimulus type.
2. Select the values to be measured (see note below).
3. Select the Source Mode. In this case we want it to be Const.
4. Setup the source bias.

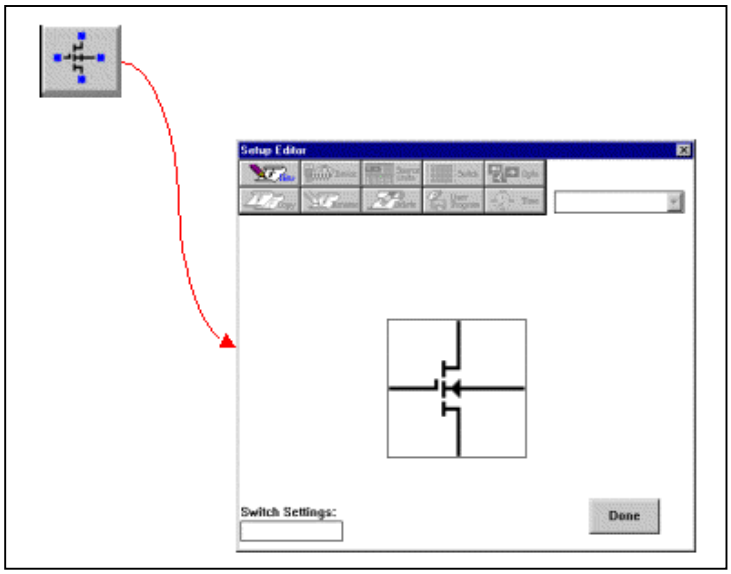
Note: Most SMU's can only measure the signal that is not being sourced. Therefore in this case we have selected the Stimulus to be Voltage resulting in the Current being measured. The values returned for Voltage in this case would be the calculated voltage steps. The opposite is true when the Stimulus mode is set to Current. Please note that these inputs vary for different instruments.

Creating a Time-Based Measurement

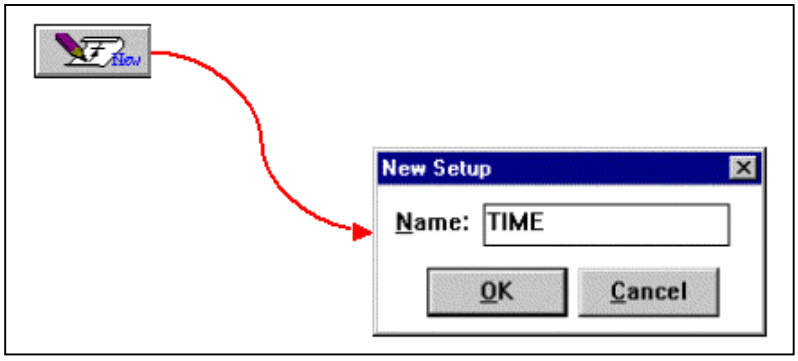
In this example we will create a time-based measurement. Most of the steps are the same or similar to creating a spot measurement. The first step is to open the setup editor.

To Create a Time-Based Measurement:

1. Open the setup editor.
The Setup Editor is the place in ICS where the measurement is configured. It can be opened by clicking the Setup Editor button.

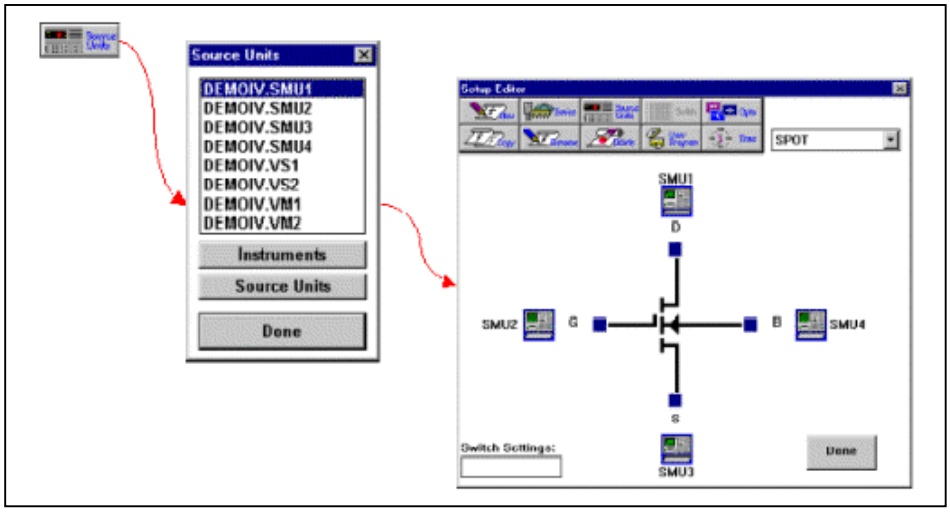


2. Name the Measurement Setup.
Each measurement must have a unique name. Before the measurement can be created, it must be given a name. To name the measurement:



a. Click the New button and type in a name.
b. Click the OK button after entering the name.
c. Select Source Units.

The source units correspond to the outputs of the instrument you are using. Metrics ICS provides a graphical way to document the connects for later reference. To add a source unit:



a. Click on the Source Units button to open the Source Units window.
b. Highlight the specific unit.
c. Click the blue box beside the device lead in the Setup Editor.

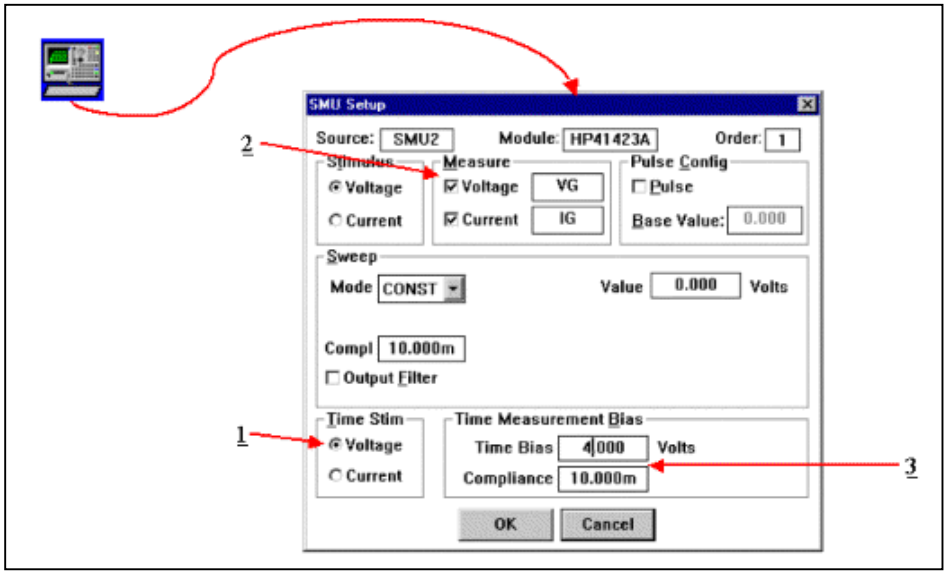
To remove a source unit:

a. Highlight the specific unit.
b. Click the blue box beside the device lead in the Setup Editor.
c. Click the Yes button.

Note: The graphic is merely a representation of the device. The software does not expect behaviors from the data. Thus, the pinout does not have to exactly match, rather it is only for reference.

3. Configure Source Units.

In this example we are creating a time stimulus source, so we must configure the source unit properly. To setup a time stimulus source:

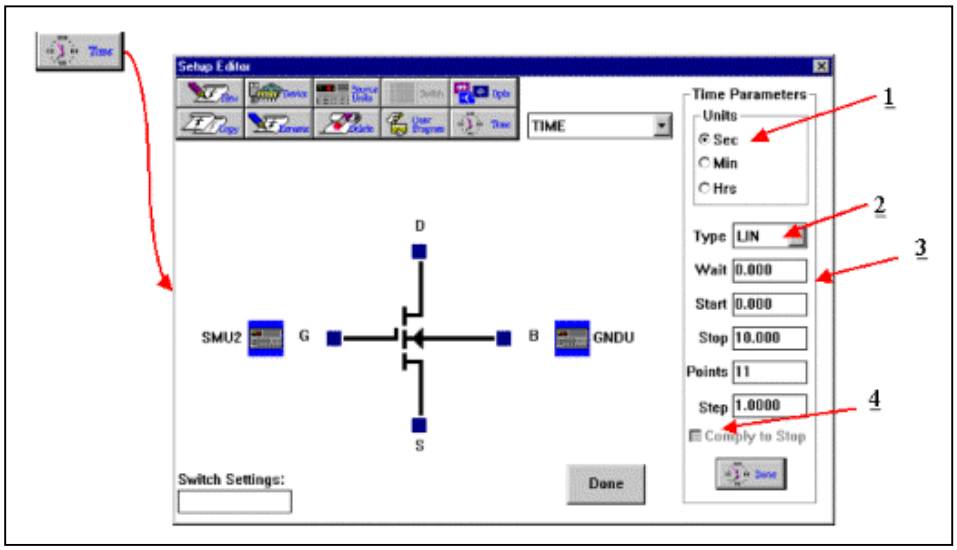


1. Select the stimulus type.
2. Select the values to be measured (see note below).
3. Select the Time Bias and Compliance.

Note: Most SMU's can only measure the signal that is not being sourced. Therefore in this case we have selected the Stimulus to be Voltage resulting in the Current being measured. The values returned for Voltage in this case would be the calculated voltage steps. The opposite is true when the Stimulus mode is set to Current. Please note that these inputs vary for different instruments.

4. Set Time Parameters.

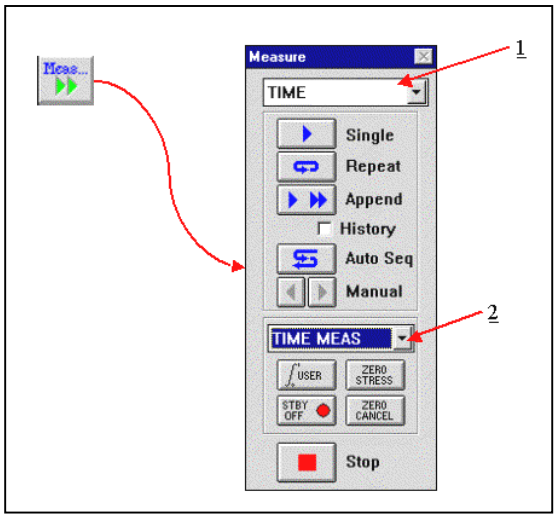
We must specify the time interval that the measurements will be made. To setup the time parameters:



1. Select the Time Units.
2. Select the sampling type.
3. Enter the Wait time.
4. Enter the Start, Stop, and Step values. Select the Comply to Stop, option if desired.

5. Set Measurement Mode.

We must specify the measurement mode as Time Meas. To setup the measurement mode:



1. Select the Setup.
2. Select the Time Meas mode.

Module 4- Executing Measurements

Introduction

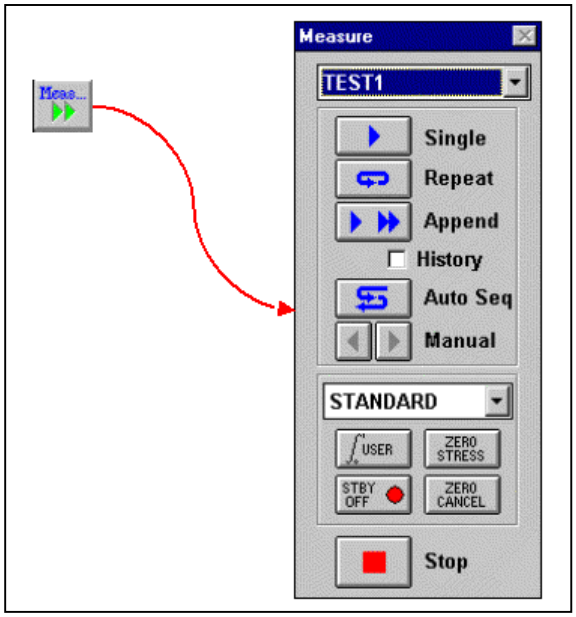
This Module details the execution of the measurement using ICS.
Note: When creating new tests it is recommended that the data be measured before the analysis is created.

Topics Covered

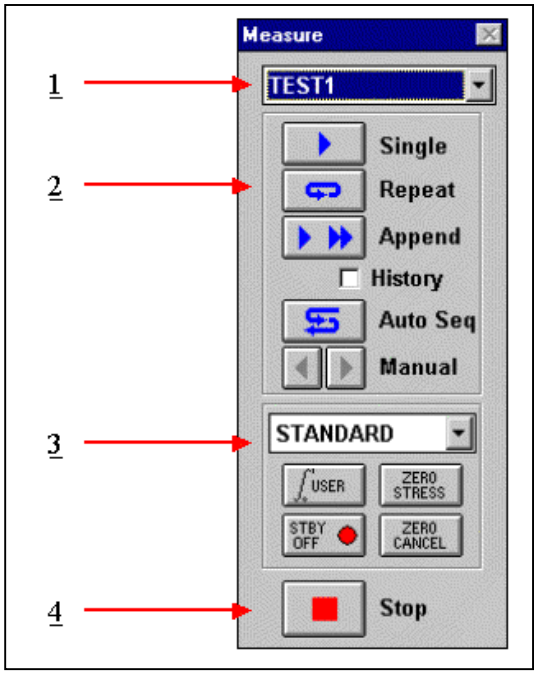
- Measurement Remote Control
- The Data Window

Measurement Remote Control

Metrics ICS contains a tool named the Measurement Remote Control. This control is activated by clicking the Measure button on the ICS toolbar.



This toolbar contains buttons to begin the measurement as well as menus to select the measurement and mode.
Note: The remote control window can be moved anywhere on the desktop.



The Measurement Remote Control has four sections.

Section 1: Measurement Menu

This pull-down menu allows the selection of a specific test to be executed.

Section 2: Execute Buttons

This section contains the buttons that will start the measurement. Several modes of measurement are available and the buttons correspond to the selected mode.

Section 3: Measurement Mode Menu

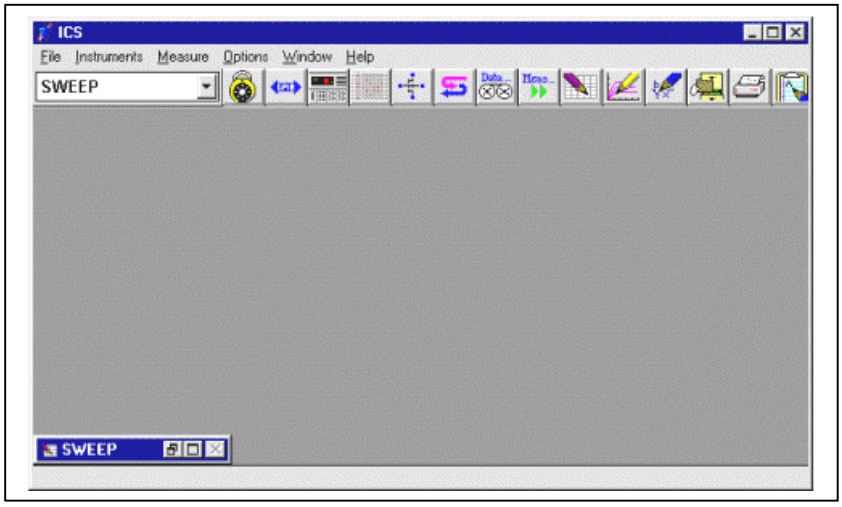
This pull-down menu allows the selection of the measurement mode. Most measurements are made in standard mode, however ICS does support several specialized measurement modes which require this to be modified.

Section 4: Stop Button

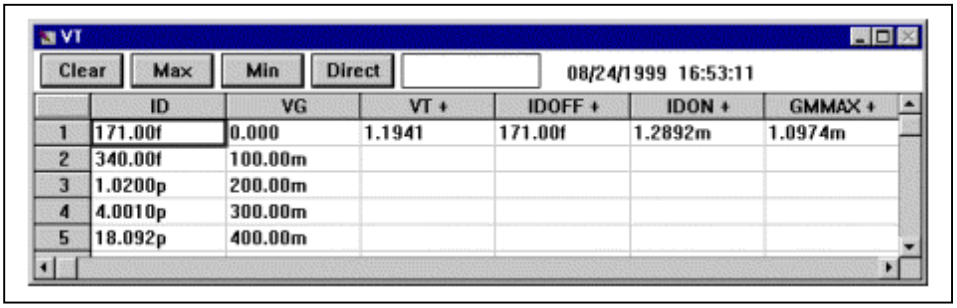
This button allows the user to stop the measurement.

The Data Window

When a new setup is created the spreadsheet is automatically created when a test setup is created. It will begin as a minimized window in the lower left corner of the ICS window. To view the data simply double-click the window that has the same name as the test setup.



The Data window automatically returns the measured data and displays it. When parameters are extracted the values are also displayed.



	ID	VG	VT +	IDOFF +	IDON +	GMMAX +
1	171.00f	0.000	1.1941	171.00f	1.2892m	1.0974m
2	340.00f	100.00m				
3	1.0200p	200.00m				
4	4.0010p	300.00m				
5	18.092p	400.00m				

Note: ICS has a feature named "Data View". This feature allows the user to select that only data vectors that are chosen be displayed. To enable or disable this feature select Workspace from the Options menu.

Module 5- Plotting Data

Introduction

This Module introduces the plotting tool of the ICS software. The plotting tool allows for the graphical analysis of data measured with ICS.

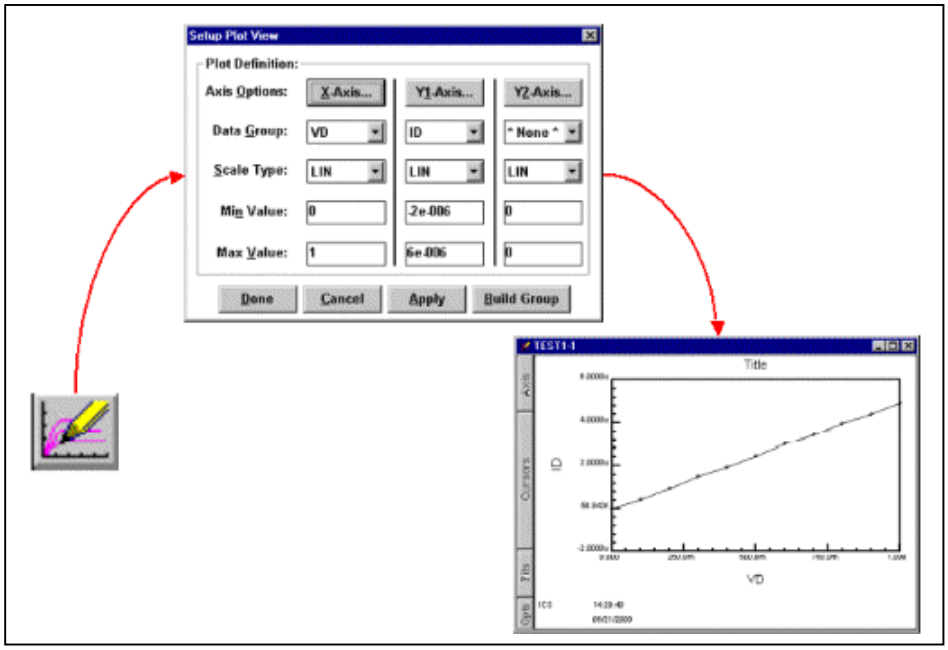
Topics Covered

- Creating a Plot
- Editing a Plot

Creating a Plot

The Metrics I/CV software uses the above illustrated sequence of execution for testing. Once all of the components have been created they are linked together within the scripts to control when and if they are executed.

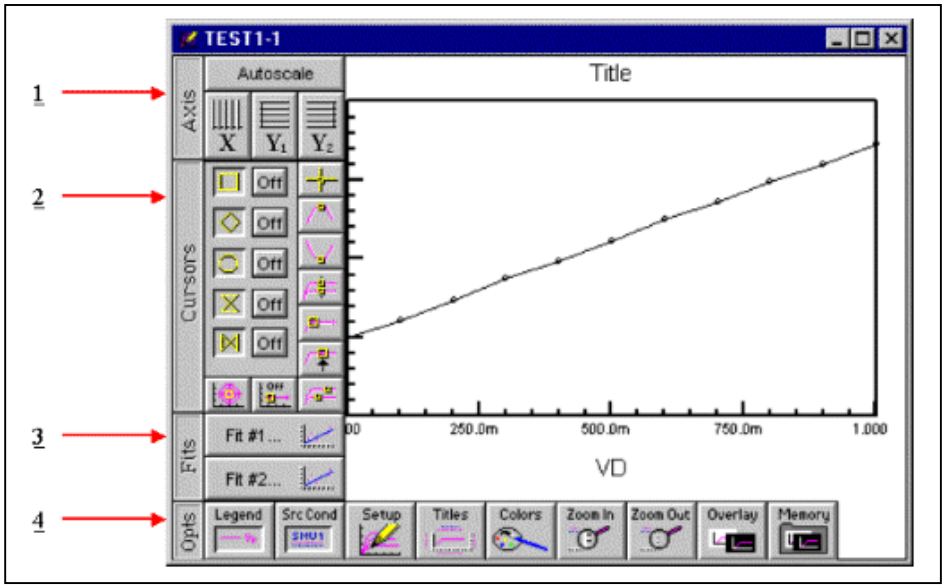
To create a new plot:



1. Click the Plot button on the toolbar.
2. Configure the plot.
3. Click the Done button and the plot will be created.

Note: The plot is made from whatever data window is currently active. The name of the plot in the Window title is the setup name followed by a dash and a number. Multiple plots can be created from the same data set, the number will just increase.

Editing a Plot



The plot window contains the editing tools for the plot.

1. The Axis button reveals the tools to change the axis from linear to logarithmic and to auto scale the plot.
2. The Cursors button allows the addition and control of cursors on the plot.
3. The Fits button allows the application of curve fits related to the cursors.
4. The Opts button presents several options for adding notes to the plot, overlaying plots, zooming features, and setup changes.

These functions are discussed in great detail within the ICS Reference Manual.

Module 6- Extracting Data

Introduction

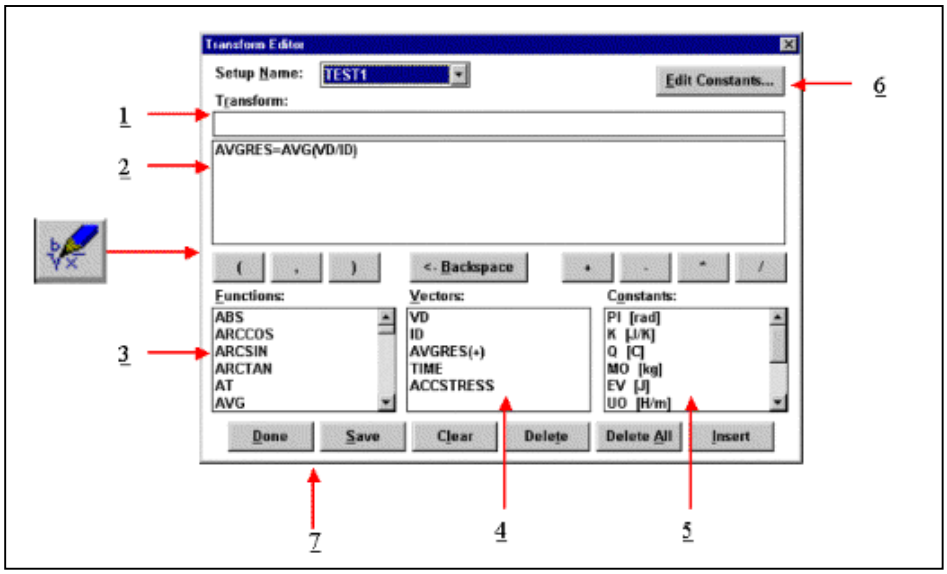
After executing a measurement, ICS can extract parameters. Once the procedures are defined, each time the measurement is run the calculations are performed automatically.
This Module demonstrates how to extract parameters from the raw data using the Transform Editor within ICS.

Topics Covered

- The Transform Editor
- Defining a Transform
- Sharing Data Between Transforms

The Transform Editor

Calculations are created within the Transform Editor. To open the editor, click the "Transform Editor" button on the ICS toolbar.



The Transform Editor contains several areas:

1. Transform Entry Box

The location to enter the transform.

2. Defined Transform List

A list of all transforms defined for this setup.

3. Function List

A predefined functions available for the calculation of parameters.

4. Vector List

A list of the measured and calculated data vectors.

5. Constant List

A list of constants that can be used in calculations.

6. Edit Constant Button

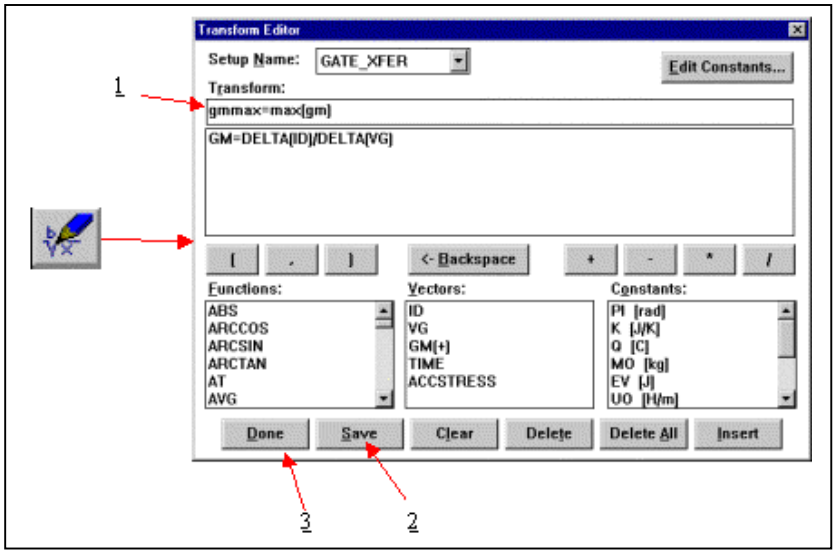
Allows constants to be defined and edited.

7. Action Buttons

Controls for the saving of transforms, deleting of transforms, and exiting the Transform Editor.

Defining a Transform

Calculations are created within the Transform Editor. To open the editor click the "Transform Editor" button on the ICS toolbar.



To create a calculation:

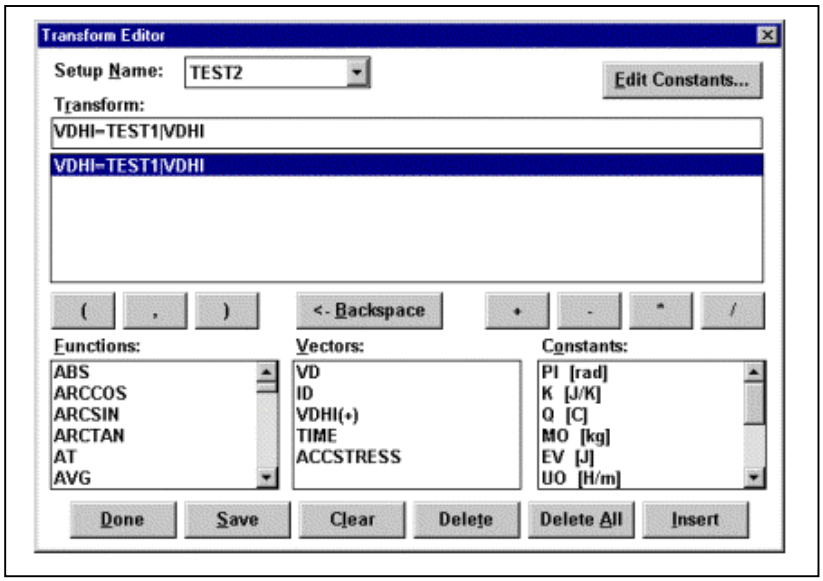
1. Enter the calculation in the "Transform" box. The calculation must be in the form result=function(vector)
2. Click the "Save" button to save the new calculation.
3. Once all calculations have been saved, click the "Done" button.

Sharing Data Between Transforms

Data vectors from one setup can be shared with another setup in the same project file. For instance, if one setup (TEST2) measures the resistance from 0-1 Volts and the second (TEST1) from 1.1-2 Volts the data can be merged to form a full sweep from 0-2 Volts.

To Share Data:

We must first create two different setups with TEST2 being the sweep from 0-1 Volts and TEST1 being the sweep from 1.1 to 2 Volts.



1. Open the Transform Editor and make sure the setup name is TEST2.
2. Create a new Transform as shown above.
3. Click the Save button.

The use of the transform result=setup name|vector name allows the data to be moved from one setup to another.

Module 7- Saving Data

Introduction

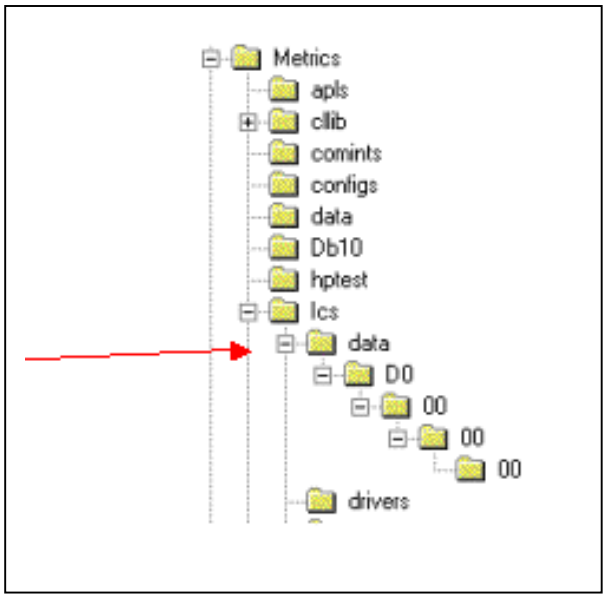
Metrics ICS has a built-in database system for storing the data. This Module covers the data. Where it is stored, how it is stored, and how to retrieve it are covered.

Topics Covered

- Where is the Data?
- Saving a Project
- Automatically Saving a Project
- Exporting Data

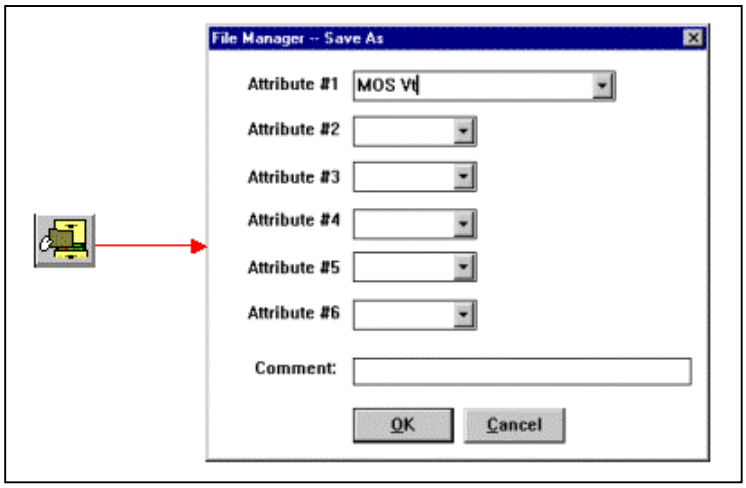
Where is the Data?

The database is installed in the Metrics\ICS\Data directory. It is very important to remember not to move files inside the database structure. The files inside this structure are part of the database structure and must not be moved.



Saving a Project

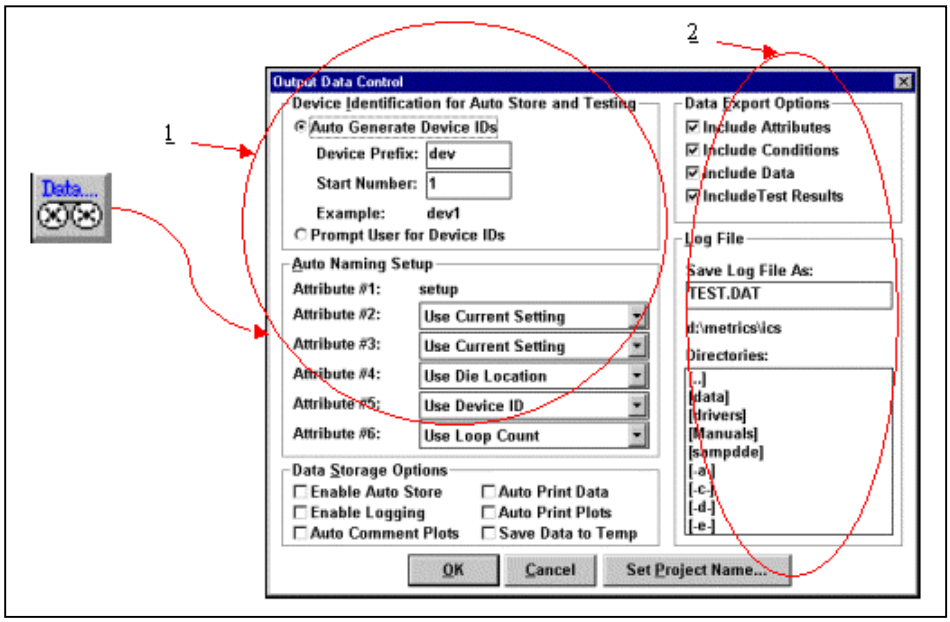
The last step to creating measurements is to save them. A measurement or collection of measurements is saved in a "Project File". To save a project file click the "Save Project" button on the ICS toolbar, enter attributes, and click the "OK".



The attributes are the equivalent of directories. Attribute 1 can be thought of as the main directory and each subsequent attribute is a sub-directory.
The file is then stored inside the Metrics ICS database.

Automatically Saving a Project

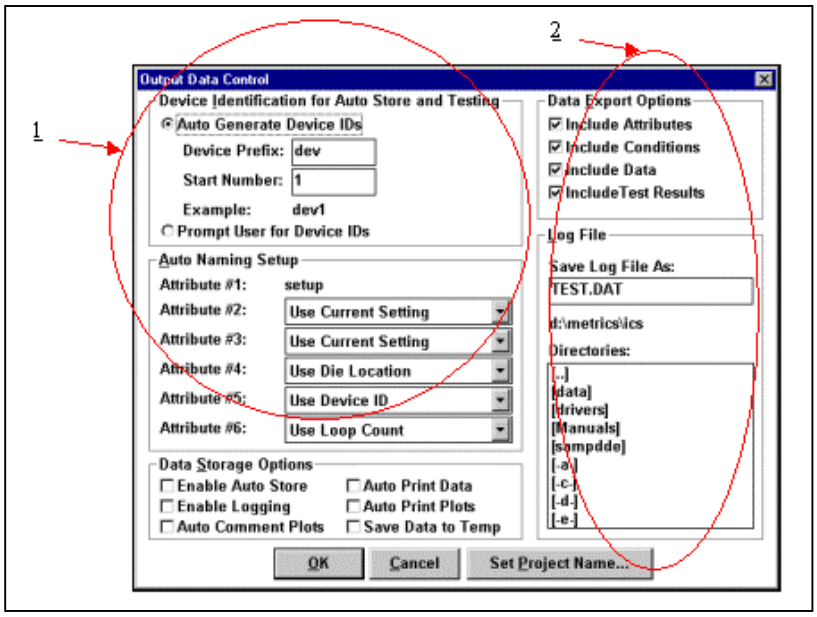
By default, ICS does not automatically save the data. However, ICS can be setup to perform this function automatically. The ICS database is designed so that it will not automatically overwrite a file with the same attributes. When using the automatic save feature, the database must be configured to change an attribute so that it does not try to overwrite a file.



All of this functionality is accessed by clicking the Global Data Return button.

The Data Control window configures two main functions:

1. **Automatic storing of data**- the data is stored in the ICS database
2. **Automatic logging of data**- the data is stored in an ASCII text file



To setup the Auto Storage of Data:

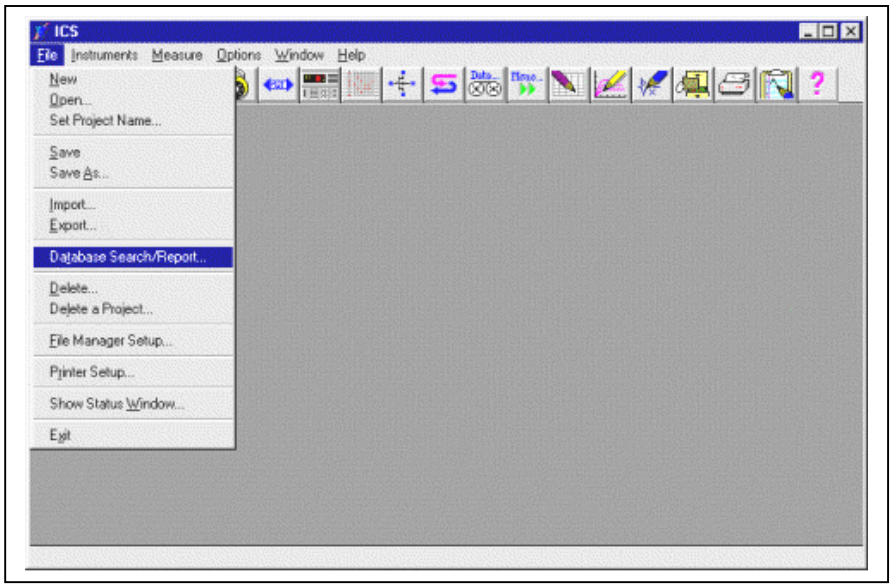
1. Check the "Enable Auto Store" option.
2. Set the attributes to either "Use Current Setting" (whatever the user sets as the attribute before executing the test) or to "Use Device ID"
3. Select to either automatically generate the ID or to prompt the user before executing the test.
4. Set the project name.

To setup the Auto Logging of Data:

1. Check the "Enable Logging" option.
2. Set the export options to match the test data you wish exported.
3. Select the directory and filename for the results file.
4. Set the project name.

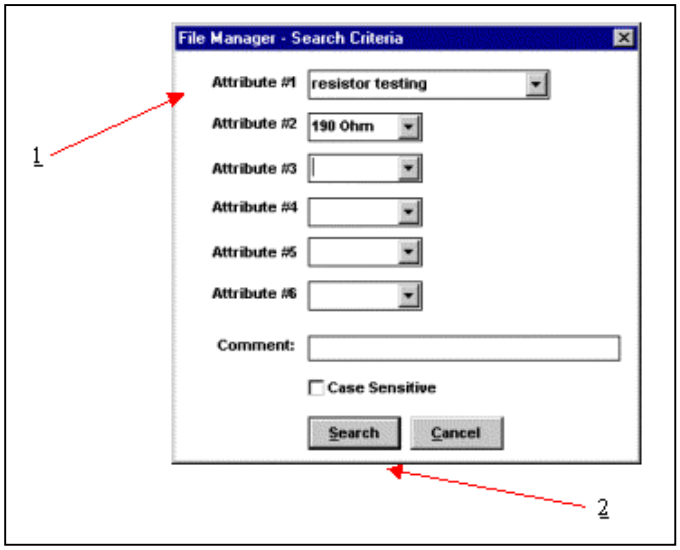
Exporting Data

If the data has already been collected it can still be exported. To accomplish this task the procedure shown will be used.



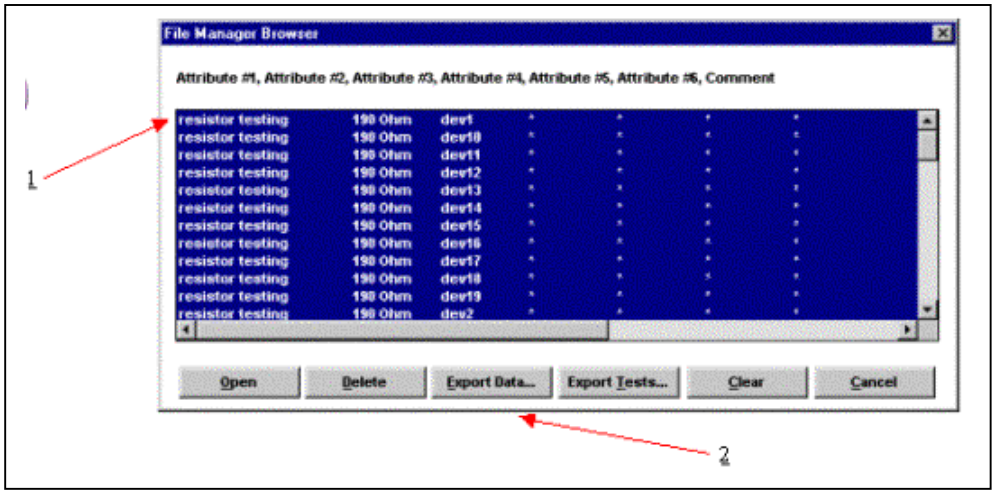
In this example several devices were measured. Attribute #1 was set as "resistor testing" and Attribute #2 was set as "190 Ohm". In the auto naming setup, both Attributes were set as "Use Current Setting". Attribute #3 was set to "Use Device ID" and the device ID was set to begin with dev1. The resulting set of files all have attributes 1 and 2 as resistor testing and 190 Ohm. However each file has a different Attribute #3. The first is dev1, the second is dev2, and so on.

To export previously collected data:



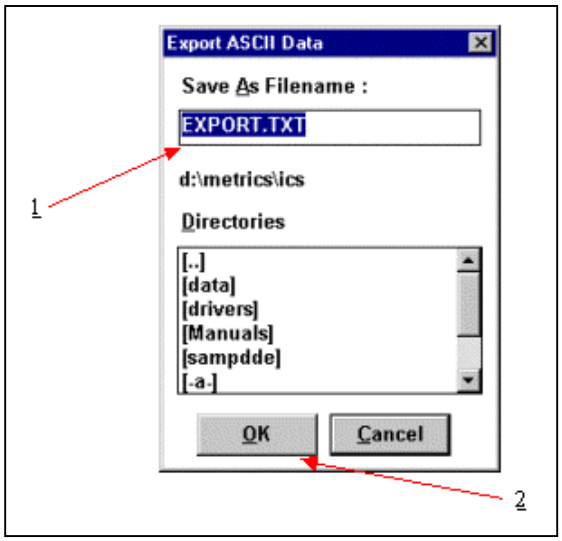
A. Query the Database

1. Query the Database for the desired files.
2. Click Search to produce a list of all files with the selected attributes.



B. Select the Files to Export

1. Highlight all of the file names that are to be exported.
2. Click the Export Data button to export the files.



C. Name the Export File

1. Enter a File Name and select the directory.
2. Click the "OK" button.

ICS will now open each file and export the data to the file selected. If multiple files are selected, the results will be appended to the end of the file.

The result is a single ASCII file with all of the data results.

Module 8- Starting Metrics Switch

Introduction

This Module covers the functionality of the Metrics Switch toolbar and the configuration of Switch.

Topics Covered

- What is Metrics Switch
- The Metrics Switch Toolbar
- Configuring a Switch Matrix

What is Metrics Switch?

Metrics Switch is a software interface for controlling popular switch matrixes. Metrics Switch communicates through the GPIB interface to setup connection patterns. Metrics Switch can be used stand-alone, integrated with Metrics ICS, or controlled via DDE.

The Metrics Switch Toolbar

The Metrics Switch toolbar is used for the creation and execution of switch patterns. The Toolbar has buttons to complete every task that Switch is capable of.

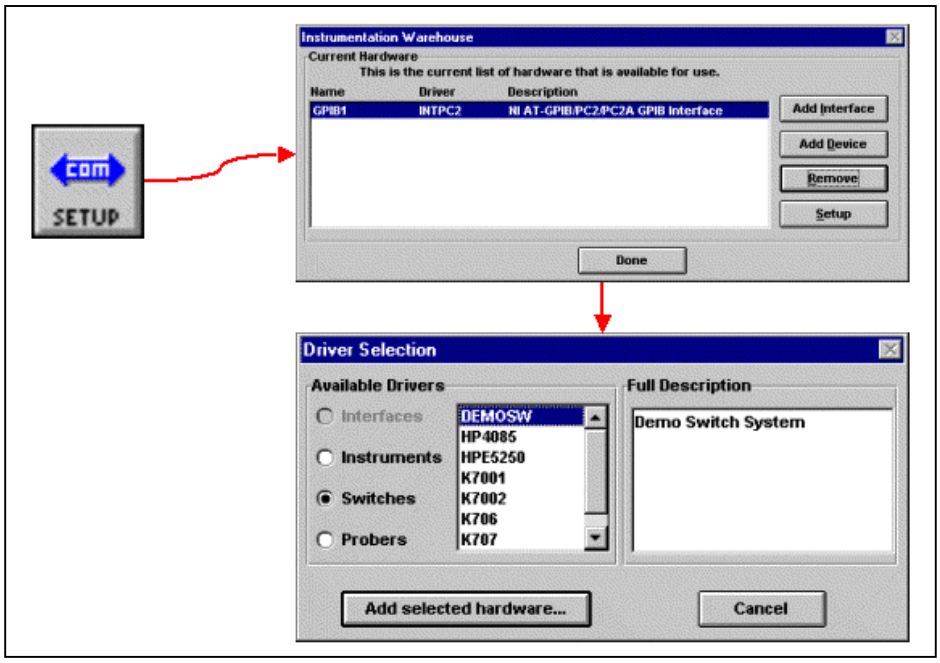
A general rule is that starting with the left-most button and continuing to the right will complete the task of creating a pattern. While this is not always the case, it is a good reference.

Configuring a Switch Matrix

Configuring a switch matrix is a three-step process. Each step is detailed below. This process must occur before a switch matrix can be used by Metrics Switch.

A. Select a driver for use.

Once the driver has been selected and configured, it is stored with the Switch database and does not have to be re-configured.

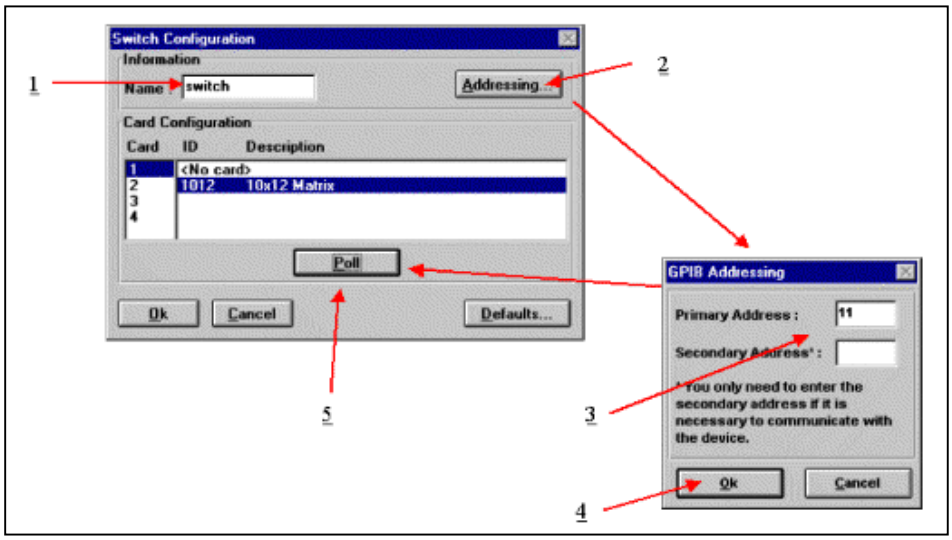


To begin selecting the driver:

1. Click the "Setup" button from the Switch toolbar.
2. Click the "Add Device" button in the Instrumentation Warehouse window.
3. Select the "Switches" option and highlight the driver to be used.
4. Click the "Add Selected Hardware" button.

B. Configure the Driver

Once a driver is selected it must be configured.



To Configure:

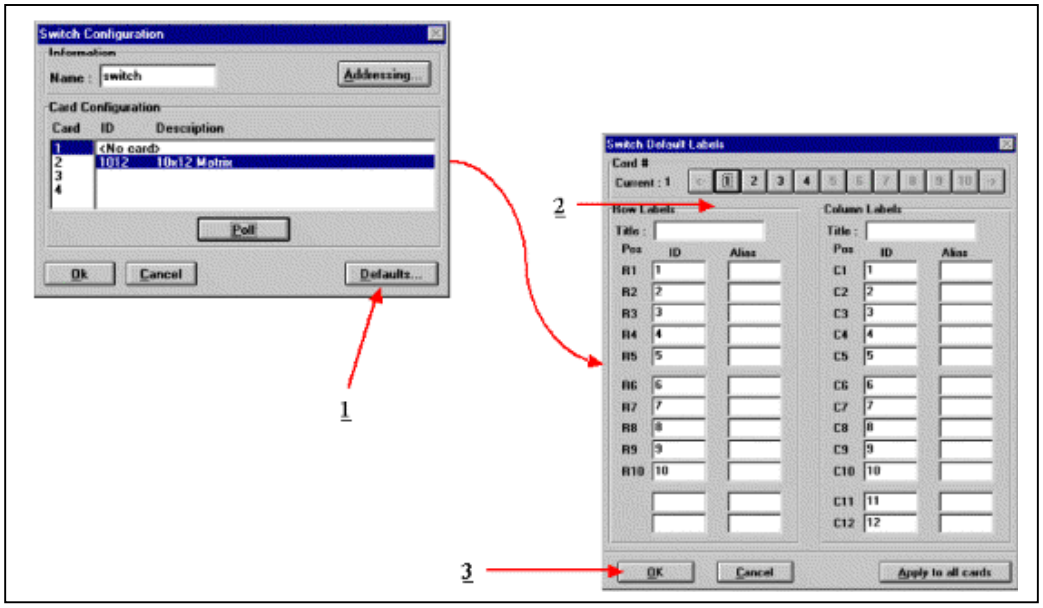
Enter a name for the switch.

1. Click the "Addressing" button.
2. Enter the GPIB address in the Primary Address.
3. Click the "OK" button.
4. Click the "Poll" button.

Most Switch matrixes have polling features where the matrix will report the card types installed. If the switch does not support this function, the card type must be manually selected. The card numbers refer to the slots in the Matrix. Some matrixes can hold more than one card.

C. Set Defaults

The labels for the cross points on the Switch Card can be setup with alias names. This can help in the rapid setup of new patterns.



To create the Aliases:

1. Click the "Defaults" button.
2. Enter any names such as SMU1 or Gate into the Alias column corresponding to the input or output of the switch.
3. Click the OK button when finished.

Module 9- Creating Switch Patterns

Introduction

The next step to completing the pattern file is to select the cross point connections that allow the instrument to connect to the device.

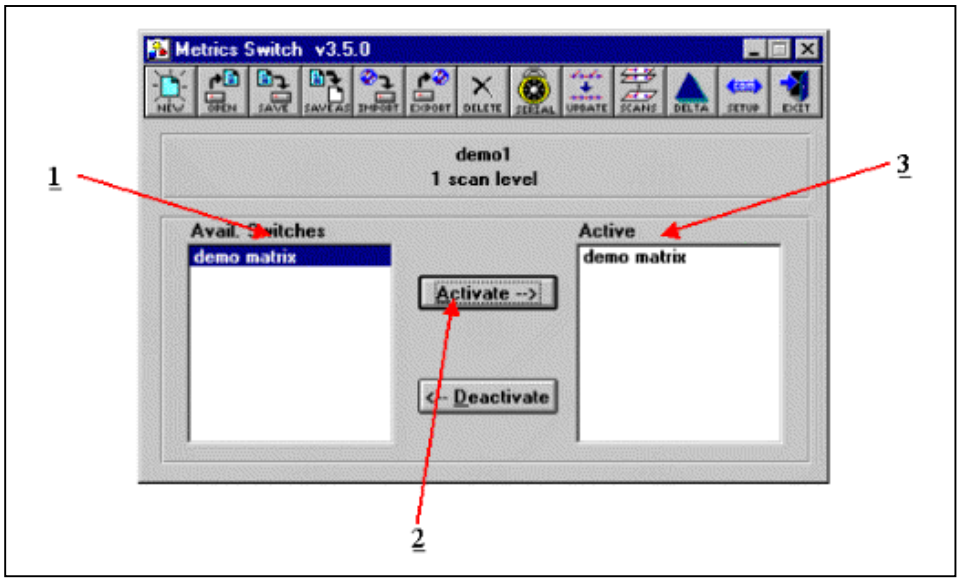
Topics Covered

- Selecting Crosspoint Connections
- Saving the Switch Connection File

Selecting Crosspoint Connections

Once a switch has been configured, the individual crosspoints can be selected to connect the instrument to the device.

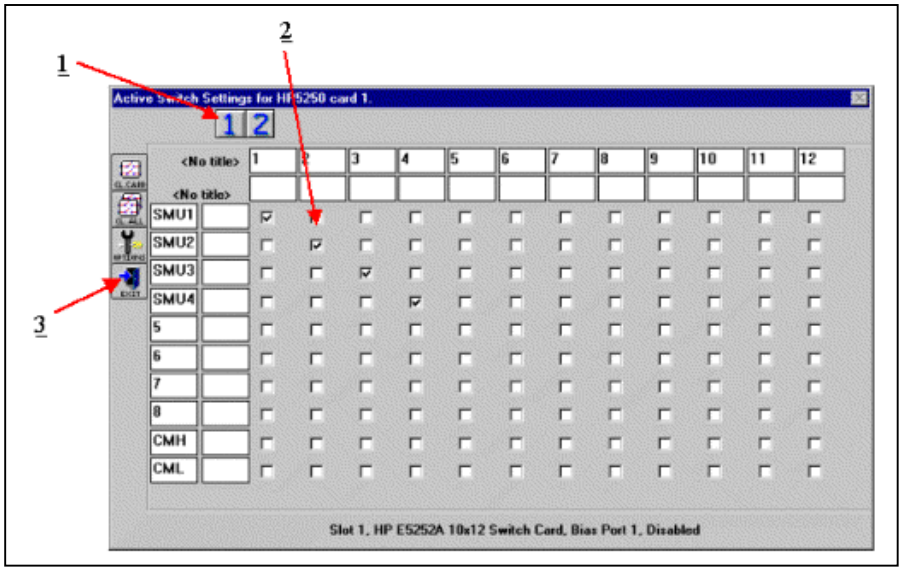
A. Select the Matrix:



1. Select the switch that will be used.
2. Click the "Activate" button.
3. Double click the switch found in the "Active" list.

Note: This architecture allows the use of multiple switch matrixes for connecting a source to a device.

B. Set the Crosspoints:

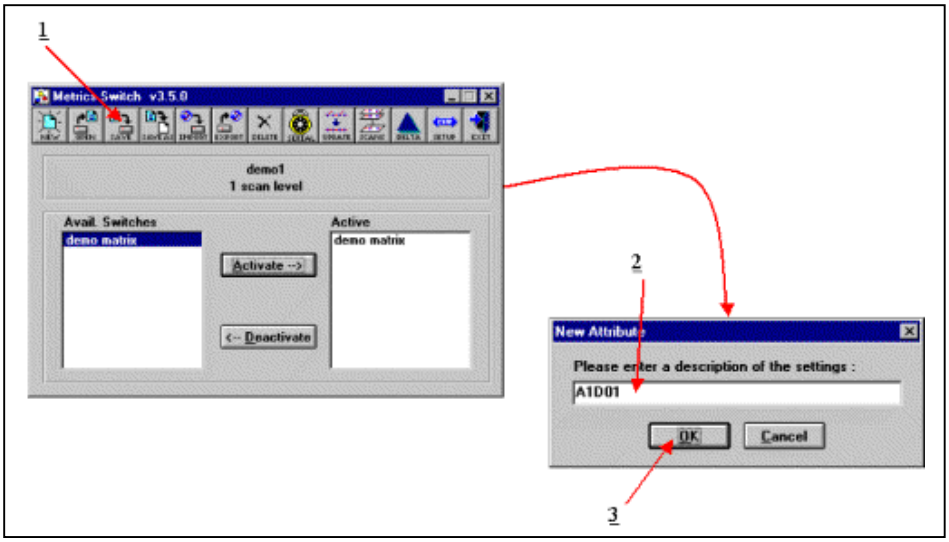


1. Click the button corresponding to the matrix card to be used.
2. Click each of the crosspoints to be set.
3. Click the "Exit" button.

Note: At this point the setting has not been permanently saved. Exiting without saving the setting will cause it to be lost.

Saving the Switch Connection File

The final step for the creation of switch setting files is to save the file.



To Save a Switch Setting:

1. Click the "Save" button.
2. Enter a name for the setting.
3. Click the "OK" button.

Module 10- Executing Switch Patterns

Introduction

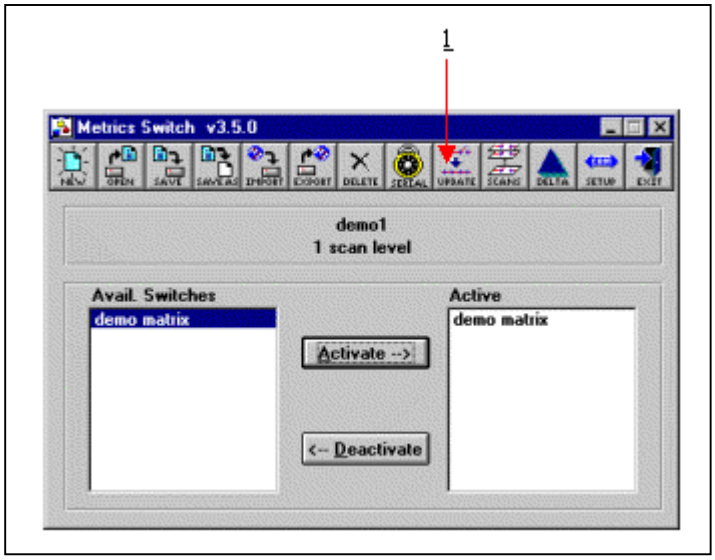
This module describes the ways to test and use the Switch patterns created.

Topics Covered

- Testing the Connections
- Stand-Alone Use of Switch
- Using Switch with ICS

Testing the Connections

The Update button sends the commands to the switch matrix for closing the selected cross points. This allows for either the execution of a test manually or for troubleshooting the system by testing paths with an Ohmmeter.

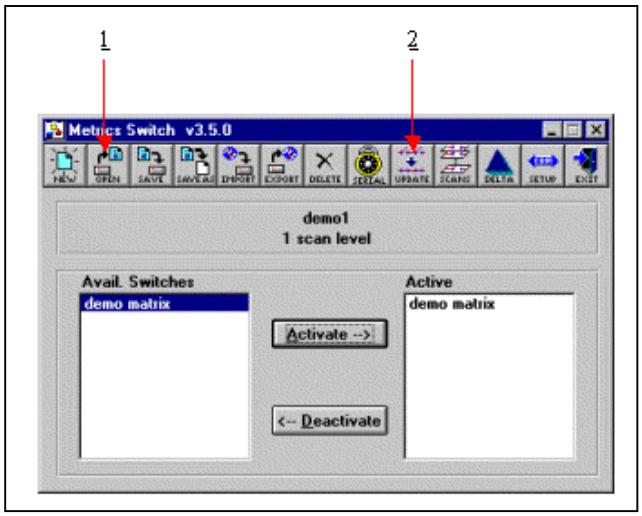


To verify the connections:

1. Click the "Update" button.

Stand-Alone Use of Switch

The same procedure as was used to verify the connections is used to control the execution of switch patterns.

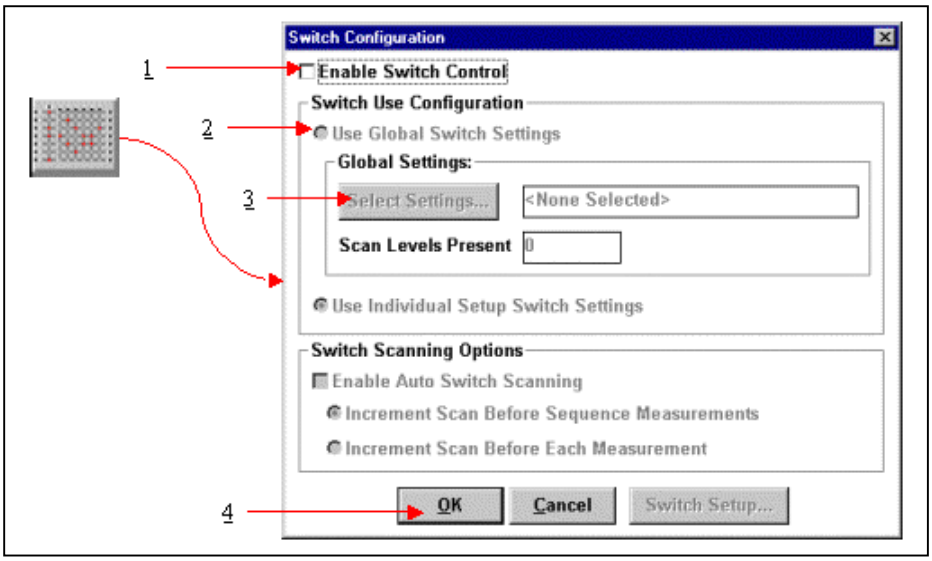


To Manually Update the Switch Pattern:

1. Open the switch pattern by clicking the "open" button and selecting pattern.
2. Click the "Update" button.

Using Switch with ICS

Metrics ICS can automatically communicate directly with the Metrics Switch software. To open the communication, click the "Switch" button on the ICS toolbar.



To Run Switch with ICS:

1. Click the "Enable Switch Control" box. (You will get an error if Switch and ICS are not installed in the same directory.)
2. Click the "Use Global Settings" option.
3. Click the "Select Settings" button and pick the pattern to use.
4. Click the "OK" button to exit the setup.

At this point when you click the Execution buttons within ICS, the switch setting will be updated before the instrument measurement is made.