*em**Power*** ®

Edit Reference Manual

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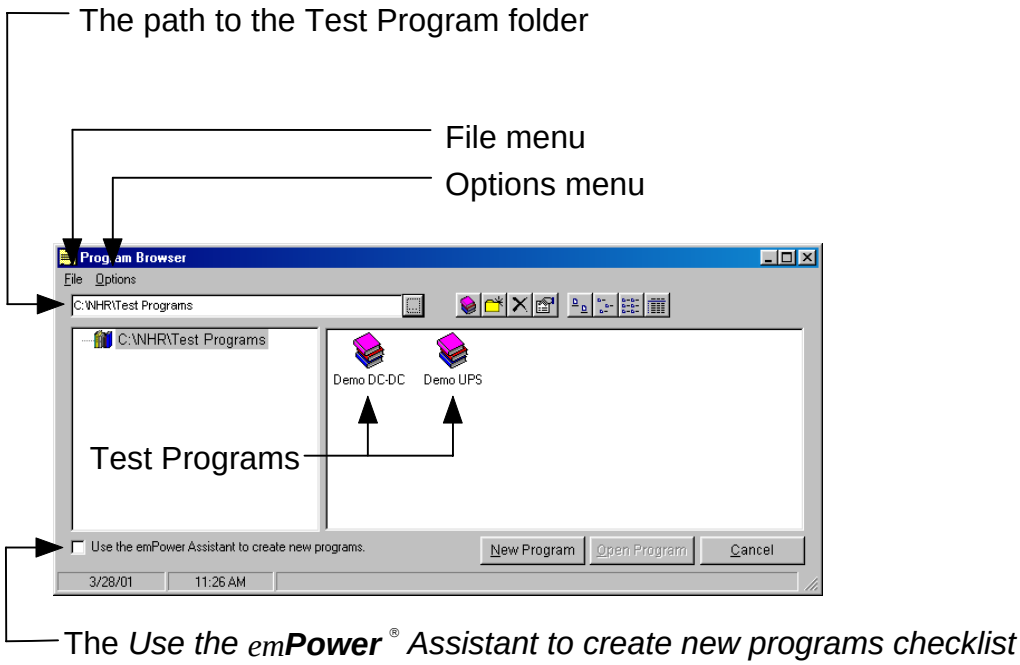


Figure 1 – The Program Browser dialog window

1.1 The Program Browser – File menu

Open the Program Browser dialog window – instructions on page 15.

Selecting an existing Test Program (by single-clicking it), then clicking File exposes the same menu, Figure 2, that right-clicking it does.

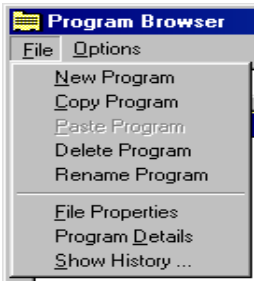


Figure 2 – The Program Browser – File menu

The Program Browser – File menu options are:

1. New Program – creates a new empty, untitled *emPower*® Test Program.
2. Copy Program – copies the selected Test Program into memory.
3. Paste Program (active only after a copy) – pastes the copied Test Program from memory.
4. Delete Program – deletes the selected Test Program for the current folder.
5. Rename Program – allows you to rename the selected Test Program.

A warning about renaming a Test Program

Using the Rename Program option in the File menu is the only proper way to rename a Test Program. You should never rename a Test Program file using the Operating System.

6. File Properties – opens the File Properties dialog window.
7. Program Details – opens the Program Details dialog window.
8. Show History – opens the Program History dialog window showing the list of backup copies of the selected Test Program.

The Show History dialog window

The file in the Show History dialog window with the lowest number is the most recent backup copy.

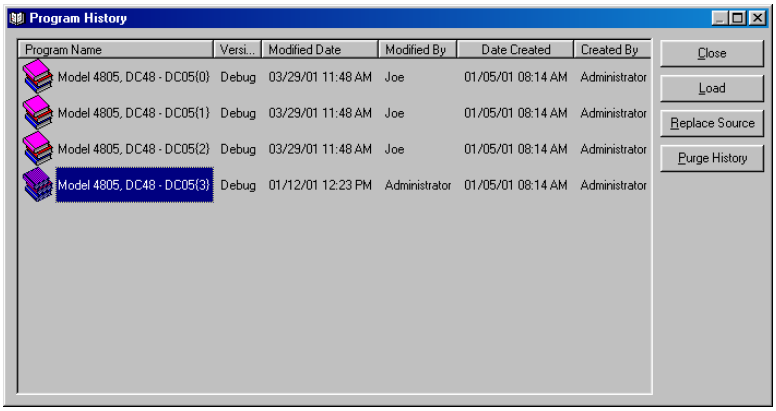


Figure 3 – The Show History dialog window

1. The Close button – closes the Program History window.
2. The Load button – loads the selected back-up copy into EDIT. Selecting File>Save on the backup copy opens the Saving Historical Files Is Not Allowed dialog window.

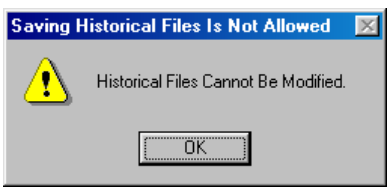


Figure 4 – The Saving Historical Files Is Not Allowed dialog window

Selecting File>Save As… is allowed, and that allows you to use a Historical File (by changing its name first) without over writing the current Test Program.

3. The Replace Source button – replaces the current Test Program with the selected backup copy.
4. The Purge History button – deletes all backup copies from the Program History list.

1.2 The Program Browser – Options menu

Open the Program Browser dialog window – instructions on page 15.

Figure 5 – The Program Browser – Options menu

The Program Browser – Options menu options are:

1. Change Root Directory… – allows you to change the current location of the Test Routine folder.
2. Backup Options… – shows the Path to the backup folder (it's the same as the Test Programs), and allows you to change the number of backup copies that will be kept there.

1.3 Changing the View settings of the Program Browser Program List pane

Open the Program Browser dialog window – instructions on page 15

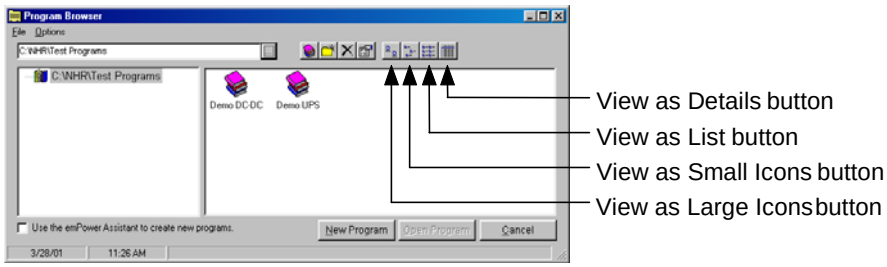


Figure 6 – The Program Browser (view) dialog window

To change the way the list of Test Programs are viewed:

Click the appropriate View button in the Program Browser dialog window.

1.4 Creating a new Test Program in the Program Browser dialog window

Open the Program Browser dialog window – instructions on page 15.

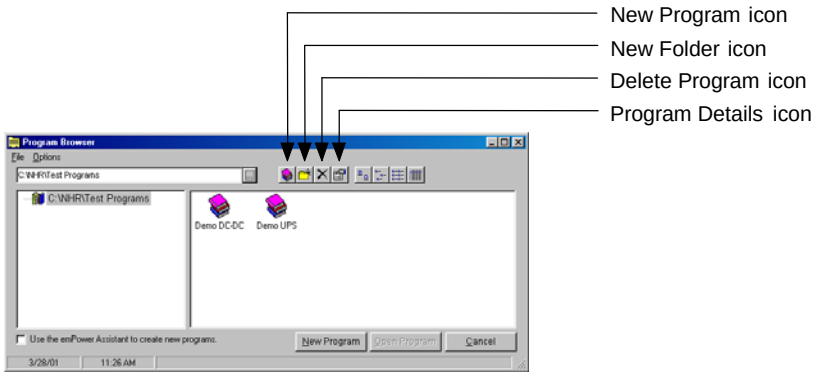


Figure 7 – The Program Browser dialog window Without Assistant:

There are 4 ways to create a new Test Program without using *emPower*® Assistant, they are:

1. Selecting New Program in the Program Browser – File menu.
2. Clicking the New Program icon.
3. Clicking the New Program button.
4. Right-clicking the Program List pane, and selecting New Program option from the menu that opens.

With Assistant:
After you check the Use *emPower* ® Assistant to create new programs checkbox, all of the above methods will cause *emPower* ® Assistant to start.

1.5 Opening an existing Test Program

Open the Program Browser dialog window – instructions on page 15.
Select (by single-clicking) the Test Program you want to open.
Click the Open Program button.

1.6 Opening the Program Browser dialog window

With no *emPower* ® application running, start *emPower* ® – instructions on page 83.

Figure 8 – The *emPower* ® toolbar

Click the EDIT button – the Program Browser dialog window, Figure 9, opens.

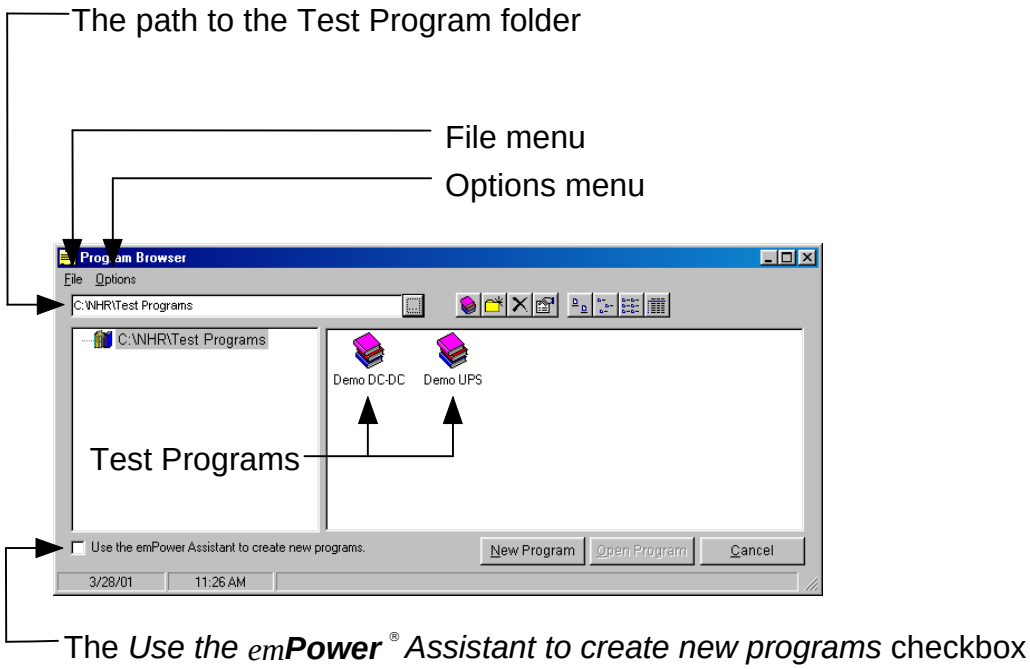


Figure 9 – The Program Browser dialog window

With an *emPower*® application running:

Figure 10 – The Program Browser dialog window

Select the Open option in the File menu, or click the Open icon.

2. THE ASSISTANT INPUT DIALOG WINDOWS

2.1 Assistant dialog window 1 – Start

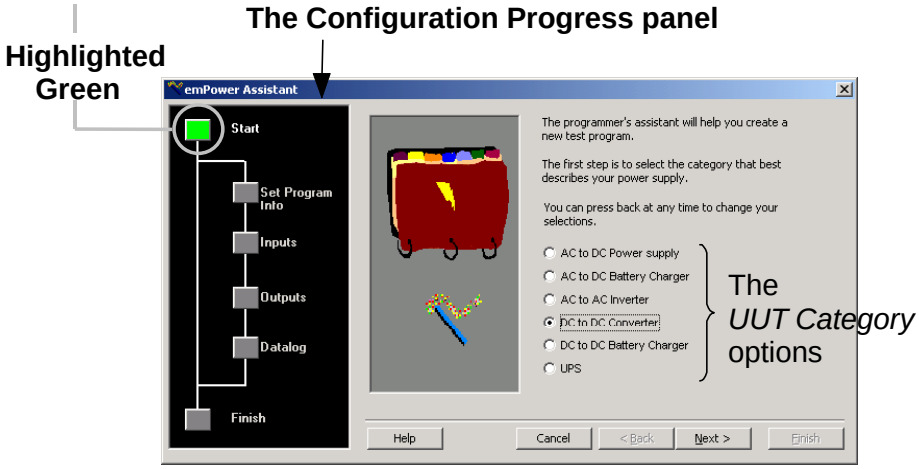


Figure 11 – The Assistant (Start) dialog window

To open the Assistant (Start) dialog window, Figure 11:
Start *emPower* ®.
Click the EDIT button in the *emPower* ® toolbar, Figure 8 (page 15) – the Program Browser dialog window opens.

In the Program Browser dialog window, Figure 9 (page 15):

Check the Use emPower Assistant to create new programs checkbox.
Click the New Program button – the *emPower* ® Assistant (Start) dialog window, Figure 11, opens.

The Configuration Progress pane

The Configuration Progress pane shows the current configuration state of the Framework Program. The illustration in Figure 11, shows that the configuration process has just started.

The UUT Category options

Select the category that best describes your UUT – *emPower* ® Assistant will only take you through the steps necessary to set up the type of UUT you select here. A DC-to-DC Converter is selected in Figure 11.

2.2 Assistant dialog window 2 – Configuring Test Program

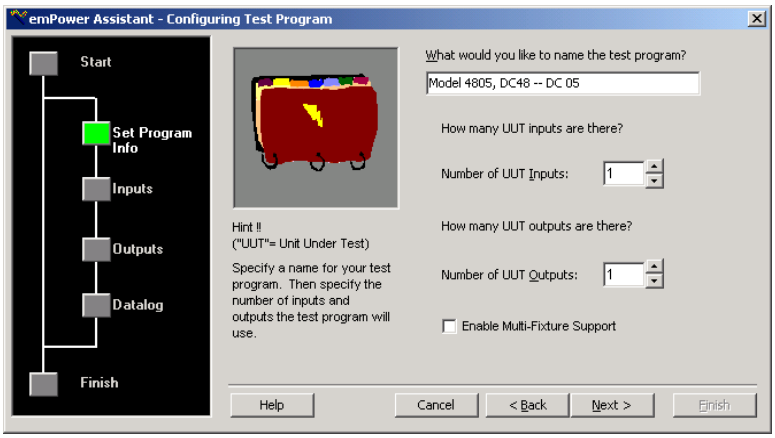


Figure 12 – The Assistant (Configuring Test Program) dialog window

In the Assistant Configuring Test Program dialog window you:

1. Give your Test Program a name – this should be a descriptive name, Figure 12 shows the name chosen for a UUT with a 48 volt DC input, and a 5 volt DC output.
2. Tell *emPower*® the number of different voltage Inputs your UUT receives.
3. Tell *emPower*® the number of different voltage Outputs your UUT produces.
4. Tell *emPower*® if you will be testing UUTs on two fixtures – by checking the Enable Multi-Fixture Support checkbox.

2.3 Assistant dialog window 3 – Configuring Inputs

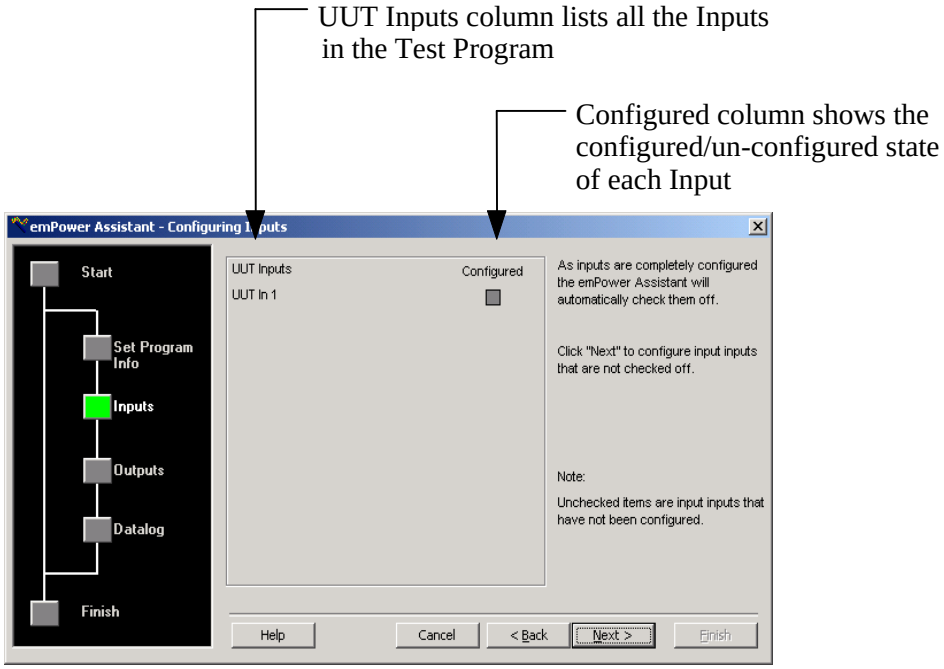


Figure 13 – The Assistant (Configuring Inputs) dialog window

This dialog window is really just providing you with configuration information. The Test Program that it comes from only has one input, and that is unconfigured. This dialog window is re-opened as each input is configured.

2.4 Assistant dialog window 4 – Input Description

An Input is any signal going into a UUT.

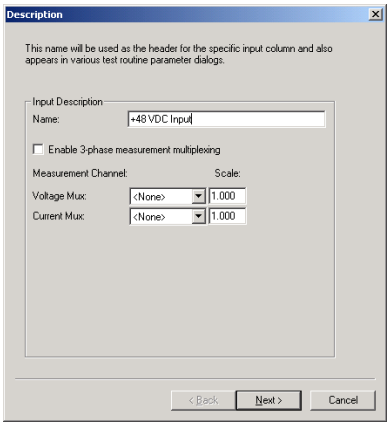


Figure 14 – The Input Description dialog window

In the Input Description dialog window you can:

1. Enter a distinctive name for the Input you are describing.
2. Select a Mux Channel for measuring the voltage, and current of the Input you are describing.
3. Enable the measurement of 3-phase input characteristics.
4. Configure the measurement of each phase of a 3-phase input.
5. Adjust the voltage, and current Scale Factors of the Input.

Distinctive names for Inputs

Although the default names for inputs: UUT In 1, UUT In 2 etc. will work in your Test Program perfectly well, it is much better to give them descriptive names. In the Input Description dialog window, Figure 14, the input is 48 volts DC so I've named it: +48 VDC Input – I'll know next week what input that is just by reading its name. You can change the name later in the <input name> Properties dialog window if you need to.

The Mux & Mux Channels
Simply put; Mux is a shortening of the term **Mu**ltiple**x**er. A Multiplexer is an electronic switch with multiple inputs and you need to tell *emPower* ® what each Mux Channel is being used for.

Selecting Mux Channels for measuring single-phase Inputs.
Some Input Devices can tell *emPower*® when asked, about the characteristics of the power being supplied to a UUT. However, you can choose to use a Digital Measurement Meter (DMM) to measure these characteristics. Before that can happen (in the Input Description frame) you need to select:

1. A Mux Channel (for the DMM) to measure the voltage being supplied to the UUT.
2. A Mux Channel (for the DMM) to measure the current being supplied to the UUT.

So, in the Input Description frame -

Select the next available channel in the Voltage Mux dropdown.
Select the next available channel in the Current Mux dropdown.

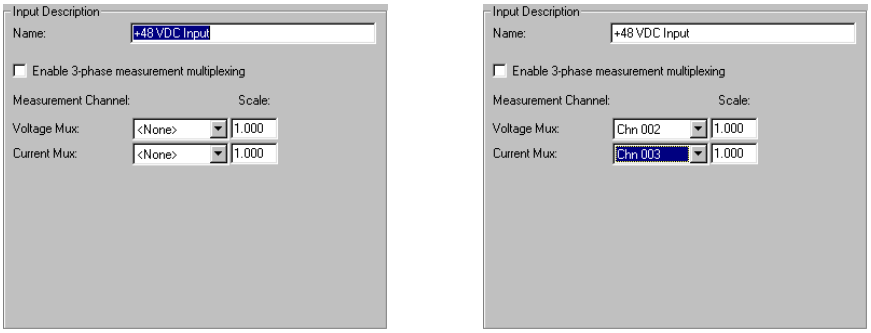


Figure 15 – The Input Description frame

Your Input Description frame should be similar to the view in the right-hand side of Figure 15. In this example, the Input named +48 VDC Input will have its voltage measured by a DMM though Chn 002 (Channel 2) of the Multiplexer, and its current measured by a DMM through Chn 003 (Channel 3) of the Multiplexer.

You don't need to select a Mux Channel for any characteristic you don't intend to measure.

See also:

1. Using the Channel Scale: field (page 21)

Enabling 3-phase measurement multiplexing of a UUT Input

Checking the Enable 3-phase measurement multiplexing checkbox allows you to measure the input characteristics of a 3-phase UUT Input Device with a Digital Measurement Meter (DMM). You might do this if your 3-phase Input is coming from a wall socket; in that case you have no other way of measuring that particular Input Device's characteristics.
Some Input Devices can tell *emPower*®, when asked, about the characteristics of the power they are supplying to a UUT. However, you can choose to use a DMM to measure these characteristics.

If, during the configuration of a 3-phase Input, you checked the Enable 3-phase measurement multiplexing checkbox, the Input Description frame changes from the view in the left-hand side of Figure 16 to the view in the right-hand side.

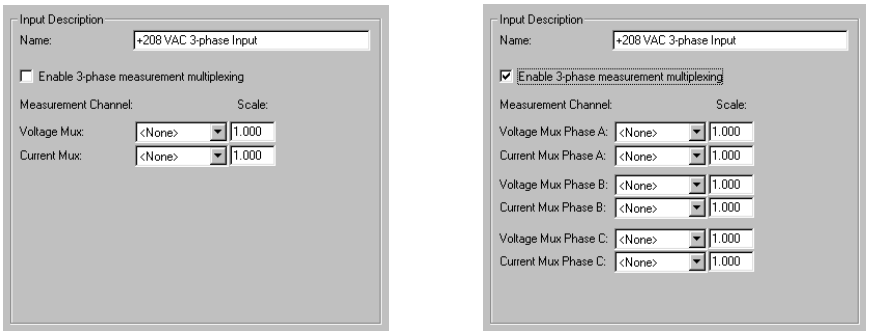


Figure 16 – The Input Description frame

At this point you need to select:

1. A Mux Channel (for the DMM) to measure the voltage being supplied to the UUT in each phase you want to measure
2. A Mux Channel (for the DMM) to measure the current being supplied to the UUT in each phase you want to measure

You don't need to select a Mux Channel for any characteristic you don't intend to measure.

See also:

1. Using the Channel Scale: field.

Using the Channel Scale: field

Sometimes the Output level of a UUT is too high to be measured by a DMM. In that case you'd need to cut the Output level (let's say in half) then tell the DMM to double the measured value. That's what the Scale: field in the Input Description frame is for; one for each Mux Channel.

Accessing the Input Description dialog within a Test Program

You can also view/change the settings in this dialog window from inside a Test Program. To do that:

Open the <input name> Properties dialog window – instructions on page 26.

2.5 Assistant dialog window 5 – Input Devices

The Input Devices dialog window shows all Input Devices available to your Test Program. The Input Devices dialog window gets its information from the Current Configuration file. The Current Configuration file is the .cfg file that contains the details of all hardware devices available to your Test Program. The .cfg file used by the Input Devices dialog window in Figure 17, is the Configuration file: Demo.cfg , it contains the details of two DC Sources, and one AC Source.

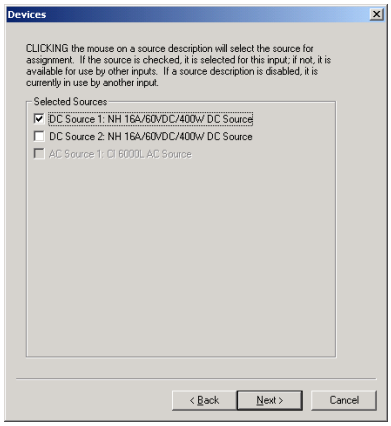


Figure 17 – The Input Devices dialog window

Checking any DC Source in the Input Devices dialog window, makes that Input Device available to your Test Program, and causes any AC Sources listed to become unavailable.

Checking any AC Sources in the Input Devices dialog window, makes that Input Device available to your Test Program, and causes any DC Sources listed to become unavailable. Sources of the same type are left available in the list to allow the Paralleling of Input Devices, although this feature is NOT currently supported in the Input Devices dialog window. You can, however, Parallel Input Devices in the NHR Configurator – refer to the *emPower*® Utilities Reference Manual -- NHR Configurator.

Accessing the Input Devices dialog within a Test Program

Open the <input name> Properties dialog window – instructions on page 26.
Click the Devices tab.

Assistant dialog window 6 – Input References

In the Input References dialog window you enter the typical values from the UUT's specifications. The number, and names of the fields you will see in this dialog window depends on the type of Input Device you selected in the Input Devices dialog window, page 21.

Figure 18 shows the Input References dialog window produced by selecting the: NH 16A/60VDC/400W DC Source in the Input Devices dialog window.

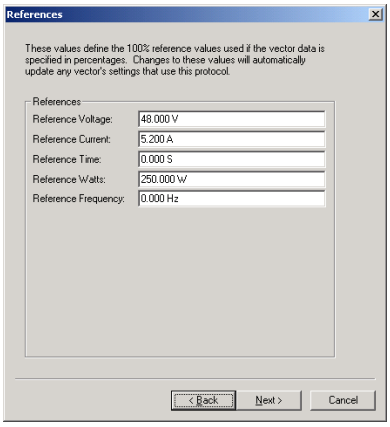


Figure 18 – The Input References dialog window

The UUT I used in this example has a maximum input voltage of 60 volts DC, and a nominal input voltage of 48 volts DC. You could enter either value in the Reference Voltage field.

In this dialog window we are leading up to the creation of the four default Input Vectors: High Line, Nom Line, Low Line, an Off. The percentage voltages these Input Vectors are created with refers to the Reference Voltage you choose here.

Your choice of Reference Voltage value depends on whether you want:

1. The High Line vector's voltage to be 100% of 60 volts, and the Nom Line vector's voltage to be 80% of 60 volts (80% of 60 volts is 48 volts)

OR you want:

2. The High Line vector's voltage to be 125% of 48 volts (125% of 48 volts is 60 volts), and the Nom Line vector's voltage to be 100% of 48 volts.

This is only a style issue – there is no preferred method.

See also:

1. **What are Input Vectors (page 24)**
2. **Using percentages of Reference Voltage values (page 24)**
3. **The formatting of entered values (page 86)**

Accessing the Input References dialog within a Test Program

You can also view/change the settings in this dialog window from inside a Test Program. To do that:

Open the <input name> Properties dialog window – instructions on page 26.

Click the References tab.

2.6 Assistant dialog window 7 – Input Defaults

In the Input Defaults dialog window you enter the values that you want **ALL** new Input Vectors to be created with. The number, and names of the fields you will see in this dialog window depends on the Source you selected in the Input Devices dialog window, page 21. Figure 19 shows the Input Defaults dialog window produced by selecting: NH 16A/60VDC/400W DC Source.

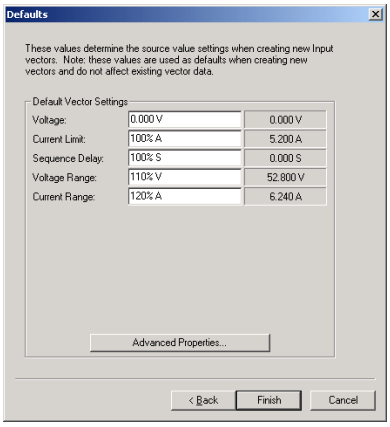


Figure 19 – The Input Defaults dialog window

In this dialog window, Assistant is asking you for the values it will use when creating each of the four default Input Vectors. Those four default Input Vectors are:

1. High Line – typically defines the state where the UUT is receiving its specified maximum operating voltage from the Source.
2. Nom Line – typically defines the state where the UUT is receiving its specified nominal operating voltage from the Source.
3. Low Line – typically defines the state where the UUT is receiving its specified lowest operating voltage from the Source.
4. Off – typically defines the state where the UUT is receiving NO power from the Source.

What are Input Vectors

An Input Vector is a snapshot of the state of a Source that contains the settings of that device at a specific point in the run of a Test Program.

Using percentages of Reference Voltage values

In the Input Defaults dialog window, it is recommended that you enter percentage values in the value fields. These percentage values are percentages of the hard values you entered in the Input References dialog window, which come from the specifications of the UUT. Using percentages of the Reference values, gives flexibility to Test Programs.

The Default Vector Settings fields

The values entered in these fields are the default values that each new Input Vector will be created with. It's simple process to change the default values of any Input Vector.

The Voltage field

For safety reasons (UUT as well as personnel) it is recommended that all your Input Vectors are created with zero volts – so enter 0 in this field.
The value you enter here is the voltage that all Input Vectors are created with.

The Current Limit field

A Source can be forced by an Input Vector to deliver n-volts to a UUT, but (since current is drawn) it cannot be forced to deliver any amps. The only control that an Input Vector has over current is to limit how much can be drawn by the UUT from the Source.

The value you enter in the Current Limit field is the default maximum current that each new Input Vector will allow the Source to deliver to the UUT.
This value should be less than the value you enter in the Current Range field.

The Sequence Delay field
An *emPower* ® Test Program may have many Input Devices.
When *emPower* ® has finished setting an Input Vector, for an Input Device it waits the value entered in the Sequence Delay field before starting to set up the Input Vector of the next Input Device.

The Voltage Range field

Limiting the Input Voltage to a UUT
One of the things you are doing by entering a value in the Voltage Range field is to say to *emPower* ® "No matter what a Test Routine tells you to do, do not deliver more voltage to the UUT than this." – this is useful because a buggy Test Routine may try to raise the input voltage infinitely.

The value you enter in the Voltage Range field, therefore, is the maximum voltage that a Source will supply to a UUT.

Giving elbowroom to the Input Voltage

The value you choose to enter in the Voltage Range field should be a little higher than you actually expect the Source to deliver to the UUT. The reason for this is to give the Input Voltage elbowroom to go a little higher (briefly) than it's told to go.

A percentage value entered in the Voltage Range field refers to the hard value entered in the Reference Voltage field (48 volts) of the Input References dialog window, Figure 18.

In the example shown in Figure 19, a value of 110% of 48 volts (52.8 volts) is used as the value for the Voltage Range field. This means that the voltage supplied to the UUT will stay in the range of: 0 volts to 52.8 volts.

Voltage range selection by *emPower*®

The value you enter in the Voltage Range field is also used when your Test Program is using a Source with many ranges.
As an example, say a Source has the two ranges: 0 – 150 volts, and 0 – 300 volts, it can usually supply power in the lowest range more accurately than it can in the highest range, so if the value entered in the Voltage Range field is in the lowest range, *emPower*® will switch the Source into that lowest range, and therefore be delivering power to the UUT as accurately as it can.

The Current Range field

It is recommended that you enter a value a little higher than the maximum input current of your UUT. A percentage value entered in the Current Range field refers to the hard value entered in the Reference Current field (5.2 amps) of the Input References dialog window, Figure 18.

The value you enter in the Current Range field should be higher than the value you enter in the Current Limit field.

Accessing the Input Defaults dialog within a Test Program.

You can also view/change the settings in this dialog window from inside a Test Program. To do that:

Open the <input name> Properties dialog window – instructions on page 26.
Click the Defaults tab.
Opening the <input name> Properties dialog window.

With EDIT running:

Click the Input tab.

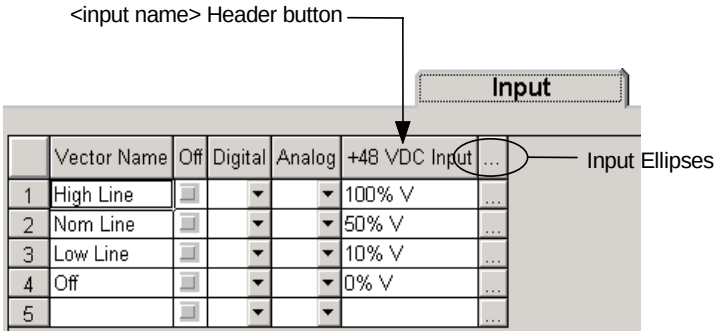


Figure 20 – A Test Program Input tab

Either:

Double-click the <input name> Header button, Figure 20, of the Input you are interested in – the <input name> Properties dialog window, Figure 21, opens.

Or:

Single-click the Input Ellipses button, Figure 20, of the Input you are interested in – the <input name> Properties dialog window, Figure 21, opens.

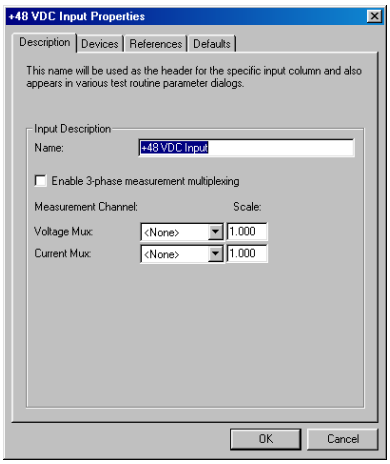


Figure 21 – The +48 VDC Input Properties dialog window

3. THE ASSISTANT OUTPUT DIALOG WINDOWS

3.1 Assistant dialog window 8 – Output Description

An Output is any signal coming from a UUT.

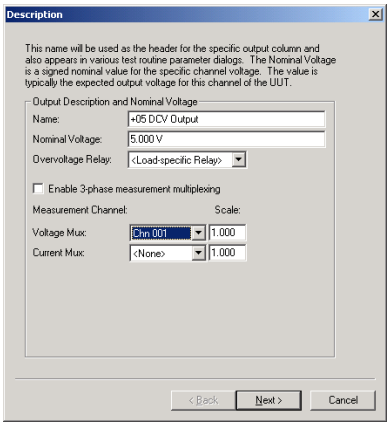


Figure 22 – The Output Description dialog window

In the Output Description dialog window you can:

1. Enter a descriptive name for the Output you are describing.
2. Enter a value for the nominal output voltage of the UUT.
3. Make a selection in the Overvoltage Relay dropdown.
4. Select a Mux Channel for measuring the voltage, and current of the Output you are describing.
5. Enable the measurement of 3-phase Output characteristics.
6. Configure the measurement of each phase of a 3-phase Output.
7. Adjust the voltage, and current Scale Factors of the Output.

Entering a descriptive name for the Output

Although the default names for outputs: UUT Out 1, UUT Out 2 etc. will work in your Test Program perfectly well, it is much better to give them descriptive names. In the Output Description dialog window, Figure 22, the output is 5 volts DC so I've named it: +05 VDC Output – I'll know next week what output that is just by reading its name. You can change the name later in the <input name> Properties dialog window if you need to.

Enter a value for the nominal output voltage of the UUT.

In the Nominal Voltage field you enter the normally expected output voltage of the UUT.

Making a selection in the Overvoltage Relay dropdown.

An Overvoltage condition exists when the Output of a UUT is supplied with a higher voltage than its specified output voltage. This is done by connecting a Source to the output of the UUT. The power supplied by the Source is allowed to be prevented from reaching the output of a UUT

by the Overvoltage Relay being Closed/Opened. By making a selection in the Overvoltage Relay dropdown, you are telling your Test Program whether you will be using:

1. An external relay controlled by a General Purpose Relay (GPR) signal.
2. An external relay controlled by a Digital Output (DOUT) signal.
3. An external relay controlled by a Load.
4. A relay contained within, and controlled by a Load.

The Mux & Mux Channels

Selecting Mux Channels for measuring single-phase Outputs
Some Output Devices can tell *emPower*® when asked, about the characteristics of the power being supplied to them by a UUT. However, you can choose to use a Digital Measurement Meter (DMM) to measure these characteristics. Before that can happen (in the Input Description frame) you need to select:

1. A Mux Channel (for the DMM) to measure the voltage being supplied by the UUT.
2. A Mux Channel (for the DMM) to measure the current being supplied by the UUT.

So, in the Output Description frame:

Select the next available channel in the Voltage Mux dropdown.
Select the next available channel in the Current Mux dropdown.

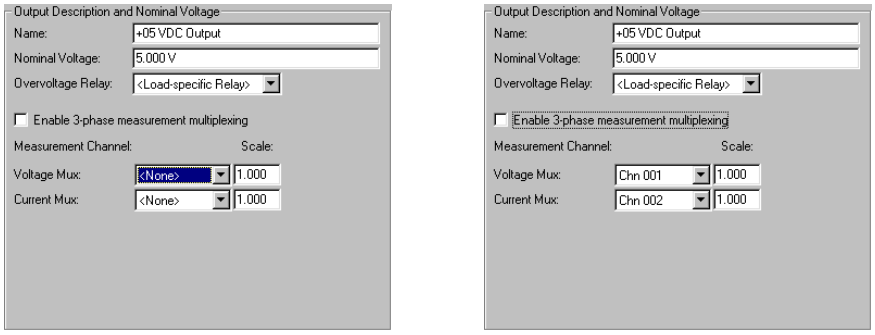


Figure 23 – The Output Description frame

Your Output Description frame should be similar to the view in the right-hand side of Figure 23. In this example, the Output named +05 VDC Output will have its voltage measured by a DMM though Chn 001 (Channel 1) of the Multiplexer, and its current measured by a DMM through Chn 002 (Channel 2) of the Multiplexer. You don't need to select a Mux Channel for any characteristic you don't intend to measure.

See also:

1. Using the Channel Scale: field (page 21).

Accessing the Output Description dialog within a Test Program

Open the <output name> Properties dialog window – instructions on page 35.
Click the Description tab.

Assistant dialog window 9 – Output Devices

The Output Devices dialog window shows all Output Devices available to your Test Program. The Output Devices dialog window gets its information from the Current Configuration file. The Current Configuration file is the .cfg file that contains the details of all hardware devices available to your Test Program. The .cfg file used by the Output Devices dialog window in Figure 24, is the Configuration file: Demo.cfg , it contains the details of four DC Load, and one AC Load.

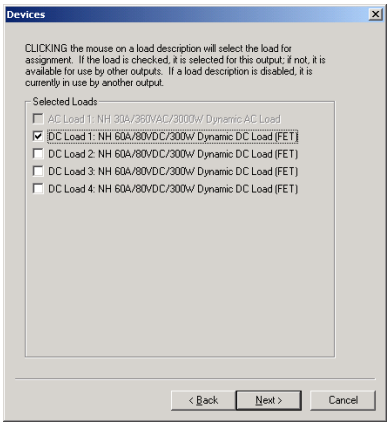


Figure 24 – The Output Devices dialog window

Checking any DC Load in the Output Devices dialog window, makes that Output Device available to your Test Program, and causes any AC Loads listed to become unavailable. Checking any AC Load in the Output Devices dialog window, makes that Output Device available to your Test Program, and causes any DC Loads listed to become unavailable.

Paralleling Output Devices (Loads)

Loads of the same types are left available in the list to allow the Paralleling of Output Devices. If these Output Devices are compatible your Test Program treats them as one Output Device. This is the recommended method since this “single” Output Device only exists in the Test Program they were paralleled in.
You may also parallel Output Devices in the NHR Configurator – refer to the *emPower* ® Utilities Reference Manual – NHR Configurator.
Paralleling Output Devices in the NHR Configurator means that the paralleled Output Devices will appear to be a “single” Output Device to all the Test Programs that use that configuration file.

Accessing the Output Devices dialog within a Test Program

Open the <output name> Properties dialog window – instructions on page 35.
Click the Devices tab.

3.2 Assistant dialog window 10 – Output References

In the Output References dialog window, it is recommended that you enter the Typical Output values from your UUT’s specifications. The hard values entered in these fields are referred to in the Output Defaults dialog window when setting up the default Output Vectors.

The number, and names of fields you will see in this dialog window depends on which Output Devices you selected in the Output Devices dialog window.

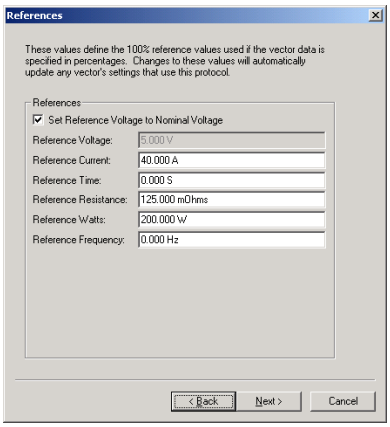


Figure 25 – The Output References dialog window

Reference Voltage

The Set Reference Voltage to Nominal Voltage checkbox is checked by default, and the Reference Voltage field is disabled. In this case you are using the value entered in the Output Description dialog window (page 29).

Accessing the Output References dialog within a Test Program

Open the <output name> Properties dialog window – instructions on page 35.
Click the References tab.

Assistant dialog window 11 – Output Defaults

A brief note on Default Vectors

In the Configuring Default Vectors dialog window (page 37) you will enter values for the first four Input Vectors, and the first four Output Vectors. The values entered there override the value you enter in the Set Value field in the Output Defaults dialog window, Figure 26.

However the first four Output Vectors will use the selection you make in the Mode dropdown, and the values you enter in the Voltage Range, and Current Range fields Figure 26.

The value you enter in the Set Value field in the Output Defaults dialog window, Figure 26, will always be used when you create new Output Vectors in the *EDIT*/Output tab.

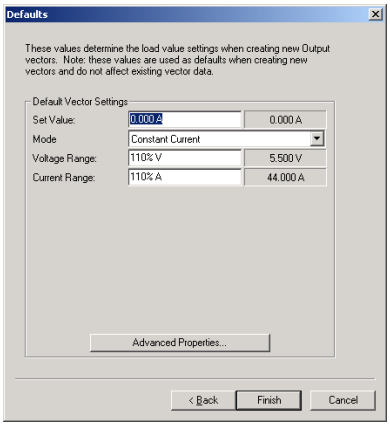


Figure 26 – The Output Default dialog window

The Set Value field

The default value for the Set Value field is 0, whether this value represents Volts, Amperes, Ohms, or Watts depends on the selection you make in the Mode dropdown.

The value you enter in this field is the Set Value used when new Output Vectors are created in the *EDIT*/Output tab.

This value is not used when Assistant creates the first four Output Vectors.

The Mode dropdown

In the Mode dropdown, you select the appropriate mode for your Default Vectors. The list that appears in the Mode dropdown depends on which Load you selected in the Output Devices dialog window Figure 24.

The Voltage Range field

The default value for the Voltage Range field is 110% of the hard value (based on the output specifications of your UUT) you entered in the Reference Voltage field of the Output References dialog window, Figure 25.

Entering percentage values in this field gives flexibility to your Test Programs.
Since a Load cannot directly control how much voltage it gets from a UUT (because Loads draw current) the value you enter in this field is informing *emPower* ® about the maximum voltage you expect the UUT to output.

Voltage range selection by *emPower* ®
The reason that *emPower* ® needs to "know" the Voltage Range value is because some Loads have many ranges, and *emPower* ® uses this value to put the Load into the best operating range for the expected voltage.

The Current Range field

The default value for the Current Range field is 110% of the hard value (based on the output specifications of your UUT) you entered in the Reference Current field of the Output References dialog window, Figure 25.

Entering percentage values in this field gives flexibility to your Test Programs.

Although a Load cannot directly control how much voltage it gets from a UUT (since Loads draws current) it can directly control how much current it gets from the UUT.

The Current Range value serves three purposes:

1. To tell *emPower*® "No matter what a Test Routine tells you to do, do not "tell" the Load to draw more current from the UUT than this." – this is useful because a buggy Test Routine may try to raise the current drawn infinitely
2. To give the Load a little elbow room, by allowing it to draw a little more current from the UUT than its specified maximum output current
3. To let *emPower*® "know" what you expect the maximum current draw of the Load to be so that *emPower*® can select the best operating range for that expected current draw

Current range selection by *emPower*®

As an example, say a Load has the two ranges: 0 – 150 amperes, and 0 – 300 amperes, it can usually draw current in the lowest range more accurately than it can in the highest range, so if the value entered in the Current Range field is in the lowest range, *emPower*® will switch the Load into that lowest range, and allow it to draw current from the UUT as accurately as it can.

Accessing the Output Defaults dialog within a Test Program

You can also view/change the settings in this dialog window from inside a Test Program. To do that:

Open the <output name> Properties dialog window – instructions on page 35.
Click the Defaults tab.

Opening the <output name> Properties dialog window

With *EDIT* running:
Click the Output tab

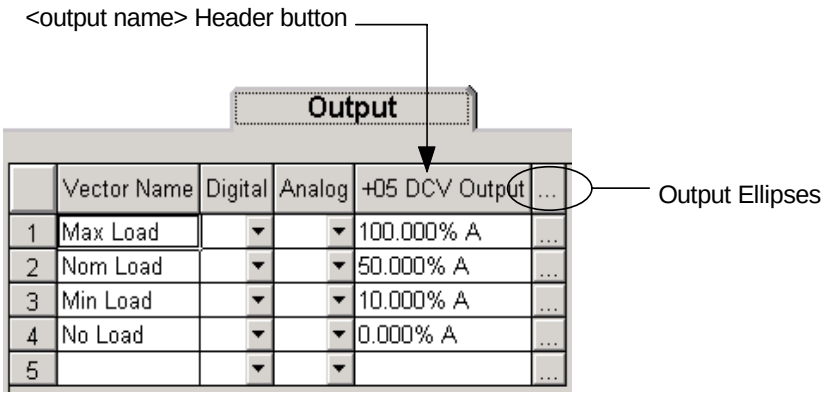


Figure 27 – A Test Program Output tab

Either:

Double-click the <output name> Header button, Figure 27, of the Output you are interested in – the <output name> Properties dialog window, Figure 28, opens.

Or:

Single-click the Output Ellipses button, Figure 27, of the Output you are interested in – the <output name> Properties dialog window, Figure 28, opens.

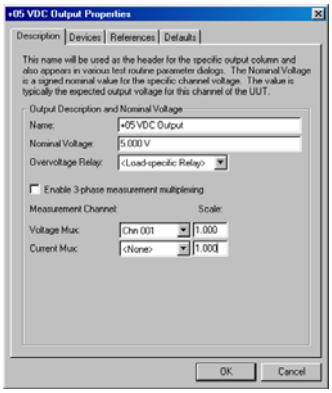


Figure 28 – The +05 VDC Output Properties dialog window

3.3 Assistant dialog window 12 – Configuring Datalog Drivers

Since most *emPower*® Test Programs print results to the screen, Assistant implements the NHR Screen Driver for you by default (listed in the Drivers Currently Implemented frame Figure 29).

However, in the Configuring Datalog Drivers dialog window you can add any of the other Datalog Drivers listed in the Available System Drivers frame, Figure 29.

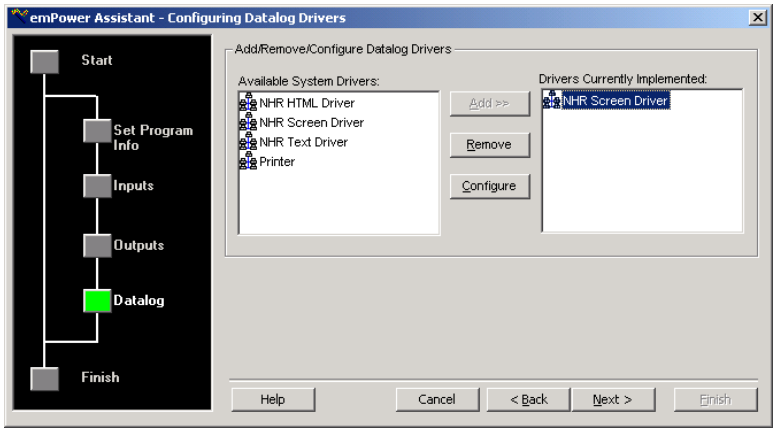


Figure 29 – The Configuring Datalog Drivers dialog window

Adding a Datalog Driver

In the Available System Drivers frame:

Select the Datalog Driver you want add to your Test Program by single-clicking it – the Add >> button becomes active.
Click the Add >> button – a device dependant configuration dialog window opens.

Removing a Datalog Driver

In the Available System Drivers frame:

Select the Datalog Driver you want remove to your Test Program by single-clicking it – the Remove >> button becomes active.
Click the Remove >> button – the Datalog Driver is removed from the Available System Drivers frame.

Configuring a Datalog Driver

A part of the process for adding a Datalog Driver is the configuration of it. After you click the Add >> button, a device dependant dialog window opens.

Changing the configuration of a Datalog Driver

In the Drivers Currently Implemented frame:

Select, by single-clicking, the Datalog Driver you want to re-configure – the Remove, and Configure buttons become active.
Click the Configure button – a device dependant dialog window opens.

Accessing the Datalog Driver dialog window within a Test Program

You can also access the Datalog Drivers dialog window from inside a Test Program. With *EDIT* running you'll see the *EDIT* icon bar, Figure 30.

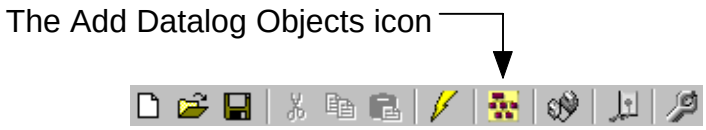


Figure 30 – The EDIT icon bar (Add Datalog Objects*)* icon

Click the Add Datalog Objects icon, in the EDIT icon bar – the Datalog Driver dialog window, Figure 31, opens.

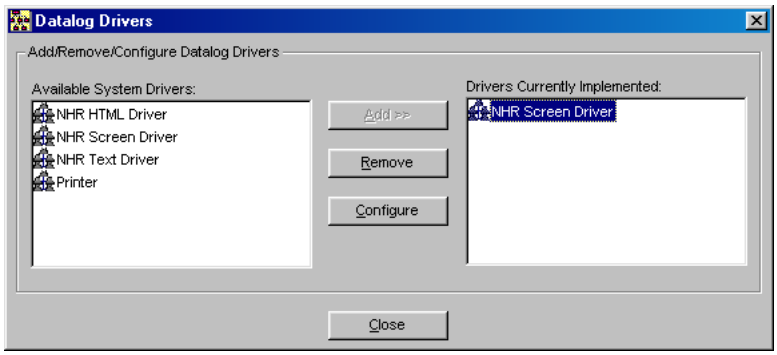


Figure 31 – The Datalog Driver dialog window

Assistant dialog window 13 – Configuring Default Vectors

This is the last step of the Assistant; here we enter values for the four default vectors for both Inputs, and Outputs.

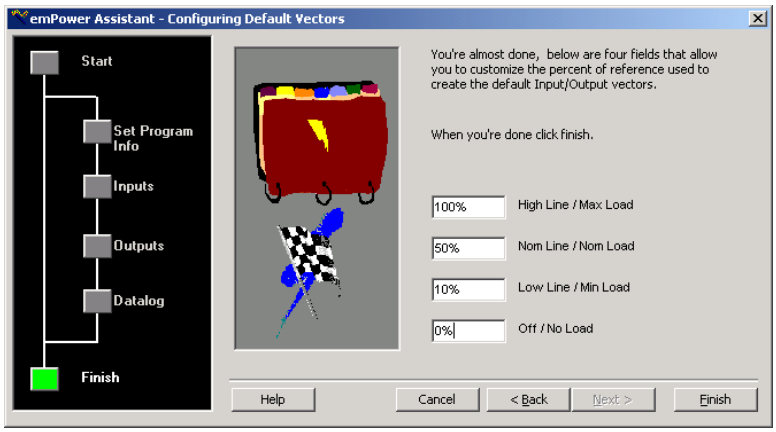


Figure 32 – The Configuring Default Vectors dialog window

More on the default Input Vectors

The percentage values entered here for the Input Vectors refer to the value you entered in the Reference Voltage field in the Input References dialog window, Figure 18.

Using Figure 32 as an example, the Input Vectors created in the dialog window are named:

1. High Line – this vector is created with 100% of Reference Volts.
2. Nom Line – this vector is created with 50% of Reference Volts.
3. Low Line – this vector is created with 10% of Reference Volts.
4. Off – this vector is created with 0% of Reference Volts.

After these four default Input Vectors are created by Assistant you may create more, but they will be created with the value you entered in the Voltage field of the Input Defaults dialog window, Figure 19.

More on the default Output Vectors

The percentage values entered here for the Output Vectors refer to the value you entered in the Reference Current field in the Output Reference dialog window, Figure 25.

Using Figure 32 as an example, the Output Vectors created in the dialog window are named:

1. Max Load – this vector is created with 100% of Reference Current.
2. Nom Load – this vector is created with 50% of Reference Current.
3. Min Load – this vector is created with 10% of Reference Current.
4. No Load – this vector is created with 0% of Reference Current.

After these four default Output Vectors are created by Assistant you may create more, but they will be created with the value you entered in the Set Value field, and will be volts, amps., watts, etc. depending on the selection you made in the Mode dropdown of the Output Defaults dialog window, Figure 26.

4. THE EDIT/PROGRAM/UUT TAB

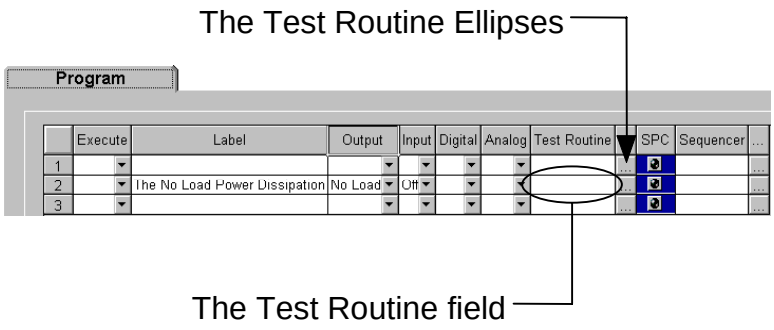


Figure 33 – The EDIT/Program/UUT tab

4.1 The Execute column

By default, each Test Step in the Program tab is always executed as it appears (top is first). The Execute column give you four Execute options, they are:

1. Always – the Test Step will be executed each time the Test Program is run.
2. A Fixture Only – in a multi-fixture.
3. B Fixture Only.
4. Never – the Test Step will never be executed.

4.2 The Label column

In this column you enter some descriptive text to "label" each Test Routine of your Test Program. For example: if you are going to run the UUT Ramp-up Test Routine, then you could enter Ramp-up Test as the label.

4.3 The Output column

In this column you select (from the dropdown) any Output Vector that exists in the *EDIT*/Output tab – this includes the option of None.

4.4 The Input column

In this column you select (from the dropdown) any Input Vector that exists in the *EDIT*/Input tab – this includes the option of None.

4.5 The Digital column

In this column you select (from the dropdown) any Digital Vector that exists in the *EDIT*/Digital tab – this includes the None option

4.6 The Analog column

In this column you select (from the dropdown) any Analog Vector that exists in the *EDIT*/Analog tab – this includes the None option.

4.7 The Test Routine column

In the Test Routine column you can perform 4 Tasks:

Task 1 – Add a Test Routine to a Test Step.
Task 2 – Remove an existing Test Routine from a Test Step.
Task 3 – Change the Test Routine used by a Test Step.
Task 4 – Modify the settings of an existing Test Routine.

Task 1 – Adding a Test Routine to a Test Step.

As an example I will show you how to add the UUT Ramp-up Test Routine to a Test Step

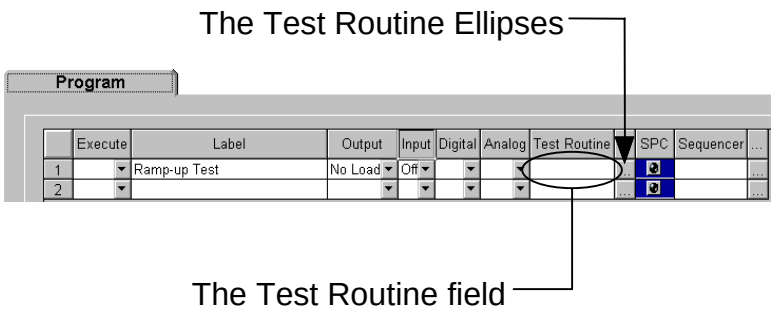


Figure 34 – The EDIT/Program/UUT tab

Click the Test Routine field – the Test Routine Selection dialog window, Figure 35, opens (in either the collapsed left-hand view, or partially expanded right-hand view).

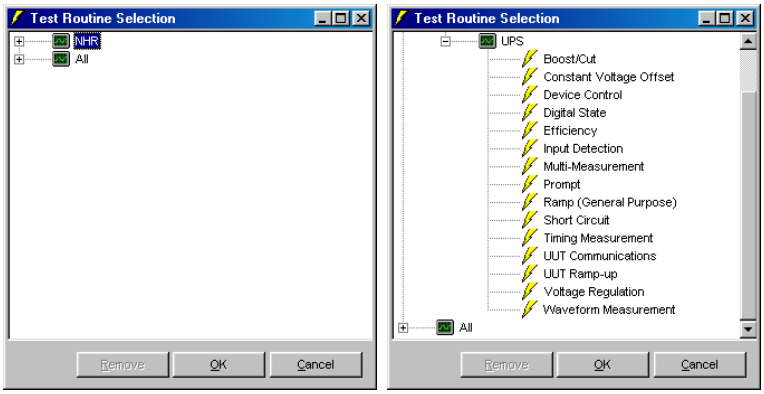


Figure 35 – The Test Routine Selection dialog window

The Test Routine Selection dialog window

You can browse the Test Routine Selection dialog window for Test Routines in the standard Windows fashion (clicking the +, and – signs to expand/collapse branches).

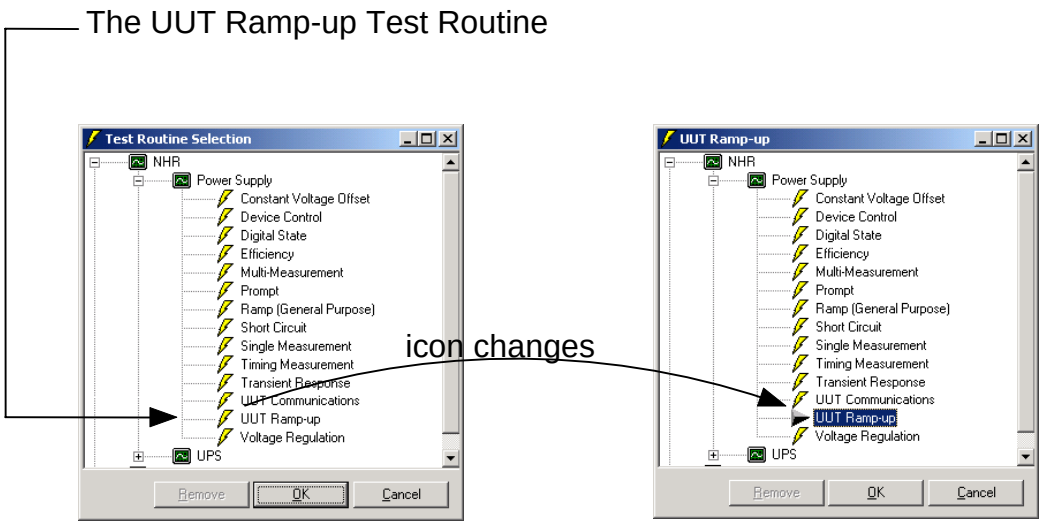


Figure 36 – The Test Routine Selection dialog window

Click the UUT Ramp-up Test Routine – its icon changes to the pointer.
Click the OK button – a Test Routine dependant dialog window opens where you enter specific settings for this Test Routine.

Task 2 – Removing an existing Test Routine from a Test Step

In the EDIT/Program/UUT tab:

Click the Test Routine field that you want to remove – the Test Routine Selection dialog window, Figure 37, opens.
Select (by single-clicking) the Test Routine you want to remove from the Test System, Figure 37.

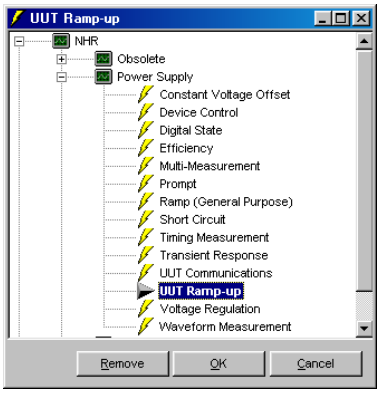
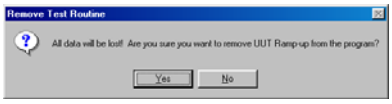


Figure 37 – The Test Routine Selection dialog window

Click the Remove button – the Remove Test Routine dialog window opens.



Click the Yes button – the Test Routine is removed from the Test Step.

Task 3 – Changing the Test Routine used by a Test Step

In the EDIT/Program/UUT tab:

Click the Test Routine field that you want to change – the Test Routine Selection dialog window, Figure 38, opens.

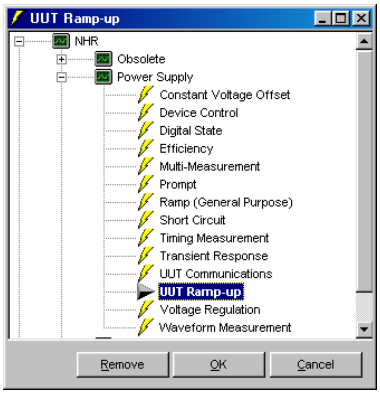


Figure 38 – The Test Routine Selection dialog window

Select (by single-clicking) the Test Routine you want to replace the current Test Routine with, Figure 39.

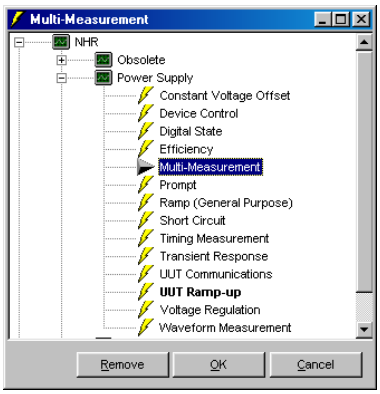


Figure 39 – The Test Routine Selection dialog window

Click the OK button – a Test Routine dependant dialog window opens where you enter specific settings for this replacement Test Routine.

Task 4 – Modifying the settings of an existing Test Routine

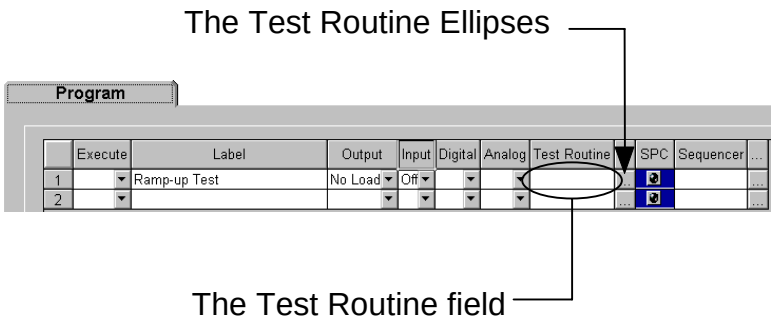


Figure 40 – The EDIT/Program/UUT tab

In the EDIT/Program/UUT tab:

Click the Test Routine Ellipses Figure 40, of the Test Routine you want to modify – a Test Routine dependant dialog window opens.

4.8 The Sequencer Control

The Sequencer Control allows you to specify what a Test Program will do after running a Test Step on a UUT, whether it passes the Test Routine or not.

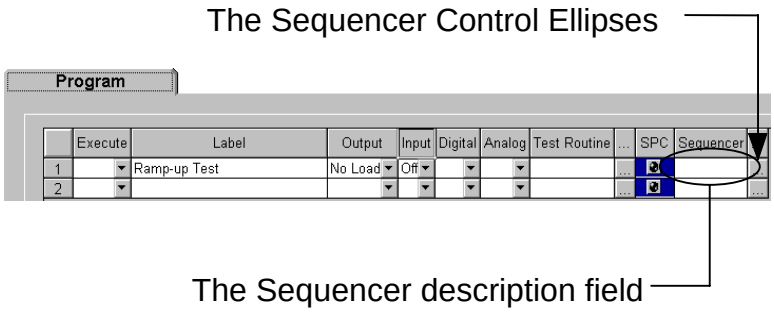


Figure 41 – The EDIT/Program/UUT tab

To open the Sequencer Control dialog window:

Click the Sequencer Control Ellipses – the Sequencer Control dialog window, Figure 42, opens.

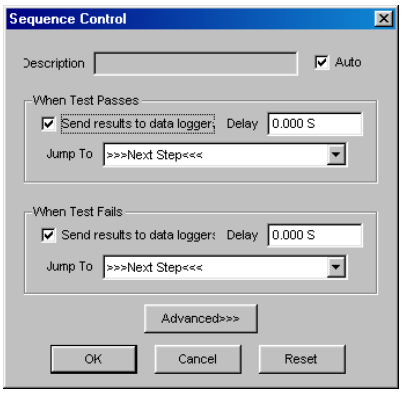


Figure 42 – The Sequencer Control dialog window

The Description field

The Auto checkbox is checked by default. When checked, *EDIT* will automatically fill the Sequencer description field in the *EDIT*/Program/UUT tab, Figure 41, based on the selections you make in the Jump To dropdowns in both the When Test Passes, and When Test Fails frames.

If the default selection of >>>Next Step<<< in a Jump To dropdown is used, it will not be appear in the Sequencer description field in the *EDIT*/Program/UUT tab.
If you uncheck the Auto checkbox, you can enter your own description in Sequencer description field.

The When Test Passes/Fails frames
In these frames you are telling *TEST* (the part of *emPower*® that actually runs the Test Programs) what you want it to do when a UUT passes/fails this Test Routine.

The Send results to data loggers checkbox

This checkbox is checked by default. When it is checked, the results of the Test Routine are sent to the Datalog Drivers in your Test Program when the UUT passes/fails the Test Routine.

The Delay field

The value you enter in this field is the amount of time (in seconds) the Sequencer Control waits between sending results to the Datalog Drivers, and it following the selection in the Jump To dropdown.

The Jump To dropdown

The selection >>>Next Step<<< is the default selection. When >>>Next Step<<< is selected and a UUT passes/fails the Test Routine, *EXEC* will move on to the next Test Step. The other options in the Jump To dropdowns are:

1. >>>RETURN<<< – the program goes to the line in the Test Program following a subroutine call

2. >>>End Test<<< – ends the Test Program, and makes a Pass/Fail determination on the UUT
3. >>>Abort Test<<< – end the Test Program, but make no Pass/Fail determination on the UUT
4. >>>Repeat Step<<< – repeat this Test Step

At the bottom of this list, is the list of Test Steps in your Test Program (listed by the names you entered in the label field).

5. THE EDIT (INPUT, OUTPUT, DIGITAL, ANALOG, MEASURE) TABS

A reminder – in **Power**Speak:

- The rows you add to the *EDIT* tabs: Input, Output, Digital, Analog, and Measure are called Vectors
- The columns you add to the *EDIT* tabs: Input, Output, and Digital are called Containers

Below are 8 Tasks that can be done in the Input tab. The methods of some tasks are common to other *EDIT* tabs; when this is the case the tabs are mentioned.

Task 1 – Adding an Input Vector (page 48), method applies to: Output, Digital, Analog, Measure tabs.
Task 2 – Deleting an Input Vector (page 49), method applies to: Output, Digital, Analog, Measure tabs.
Task 3 – Re-ordering Input Vectors (page 51), method applies to: Output, Digital, Analog, Measure tabs.

The Vectors are the rows of the spreadsheet on each tab.

Task 4 – Adding an Input Container (page 52), method applies to: Output tab
Task 5 – Deleting an Input Container (page 53), method applies to: Output tab
Task 6 – Re-ordering Input Containers (page 54), method applies to: Output tab
Task 7 – Making "No Change" Input Vectors (page 55), method applies to: Output, Analog tabs

The Inputs/Outputs are the columns of the spreadsheets on each tab. Since these tasks are common to both the *EDIT* Input & Output tabs I'm only going to show you how to do them in the *EDIT* Input tab.

There is 1 task that is unique to the Input tab:

Task 8 – Designating an existing Input Vector as an Off Vector (page 57).

Task 1 – Adding an Input Vector

The adding an Output, Digital, Analog, Measure Vectors follow the same method as adding an Input Vector.
In this example I'm using the Test Program created in the *emPower*® Quick Start Guide. It has the single Input named: +48 VDC Input.

With the EDIT/Input tab open:

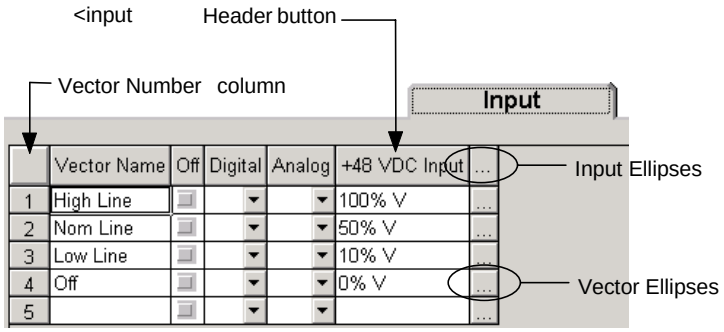


Figure 43 – A Test Program Input tab

Double-click the last number in the Vector Number column – a new Input Vector is added to the spreadsheet, Figure 44, with a default name in the Vector Name field.

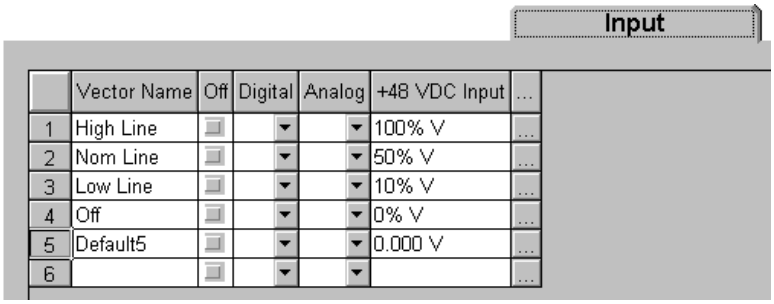


Figure 44 – A Test Program Input tab

Double-click the new Vector Name field – the default name is highlighted.
Enter an appropriate name for the new vector (or choose one from the predefined list that drops down – see Predefined Labels and Vector Names, page 86).
Make appropriate selections in the Digital, and Analog columns.
Click the Vector Ellipses – the <input name> Properties dialog window opens. Figure 45 shows the +48 VDC Input Properties dialog window.

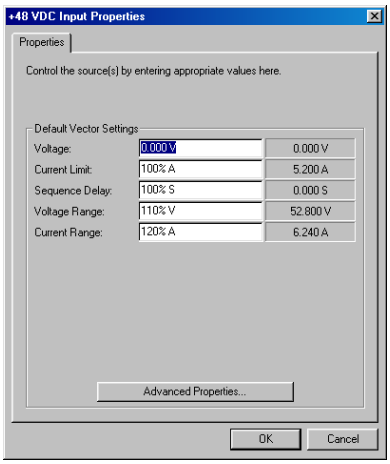


Figure 45 – The +48 VDC Properties dialog window

What you'll see:

The number, and names of the Value Fields shown in the <input name> Properties dialog window is dependant on what Source devices were selected in the Input Devices dialog window.

The values shown in these fields will depend on values entered in the Input References, and Input Defaults dialog windows.

See also:

1. **Assistant dialog window 5 – Input Devices (page 21)**
2. **Assistant dialog window 6 – Input References (page 23)**
3. **Assistant dialog window 7 – Input Defaults (page 24)**

Task 2 – Deleting an Input Vector

Deleting an Output Vector follows the same method as deleting an Input Vector.
In this example I'm using the Test Program created in the *emPower* ® Quick Start Guide, which has the single Input named: +48 VDC Input.

With the *EDIT/*Input Vector tab open:

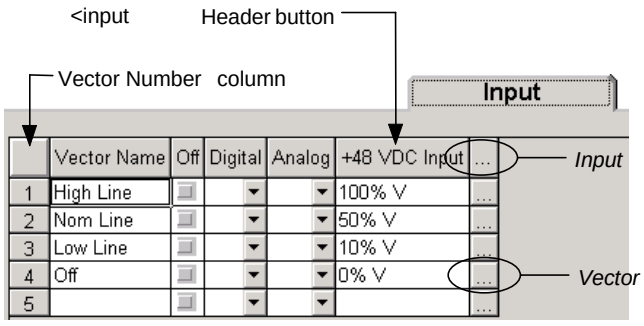


Figure 46 – A Test Program Input tab

Right-click the Vector Number button of the vector you want to delete – the Edit menu opens.

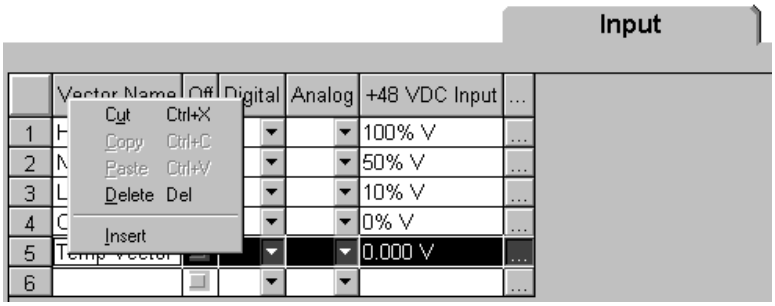


Figure 47 – A Test Program Input tab

Select Delete – a delete confirmation dialog window opens.

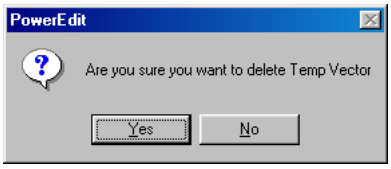


Figure 48 – A Test Program Input tab

Click the Yes button – the Input Vector is deleted from the Input tab.

Task 3 – Re-ordering Input Vectors

Reordering Output Vectors follows the same method as reordering Input Vectors.
In this example I'm using the Test Program created in the *emPower* ® Quick Start Guide, which has the single Input named: +48 VDC Input.

Let's assume you created the Input tab in Figure 49, and (for some reason) you decide that you want the Input Vector labeled Off above the Input Vector labeled Low Line.

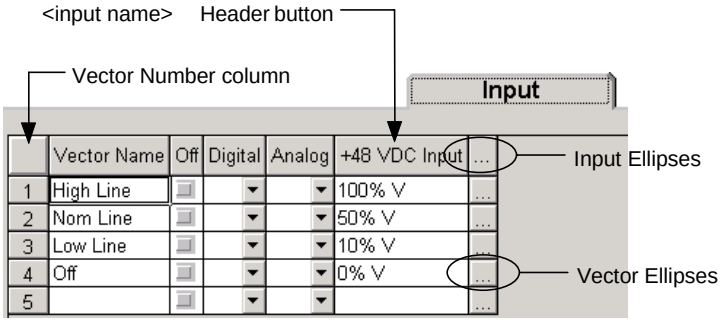


Figure 49 – A Test Program Input tab

Right-click the Vector Number button of the Input Vector labeled Off – the Edit menu, Figure 50, opens.

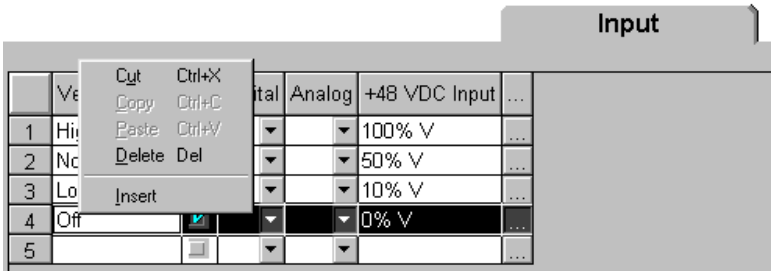


Figure 50 – A Test Program Input tab

Select the Cut option – the Input Vector labeled Off is highlighted.
Right-click the Vector Number button of the Input Vector labeled Low Line – the Edit menu, Figure 51, opens.

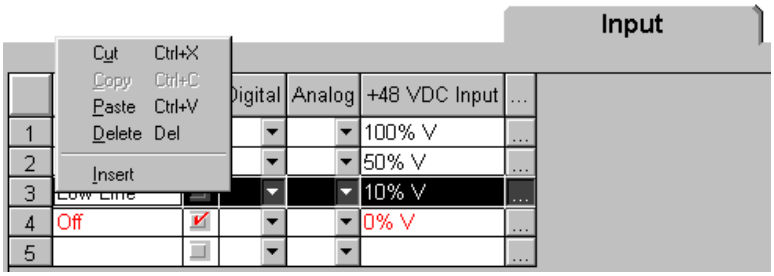


Figure 51 – A Test Program Input tab

Select the Paste option – the Input Vector labeled Off is now above the Input Vector labeled Low Line, Figure 52.

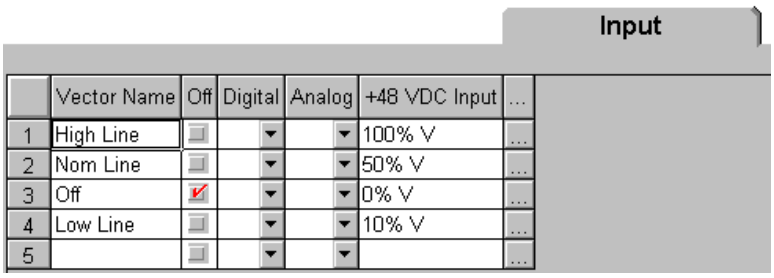


Figure 52 – A Test Program Input tab

Task 4 – Adding an Input Container

Adding an Output, or Digital Container follows the same method as adding an Input Container. In this example I'm using the Test Program created in the *emPower*® Quick Start Guide, which has the single Input named: +48 VDC Input.

Figure 53 – The EDIT icon bar (Add New Inputs) icon

With the Input tab open, the icon indicated in Figure 53, is labeled Add New Inputs.

With the *EDIT*/Input tab open:

Click the Add New Inputs icon in the EDIT icon bar, Figure 53 – the <input name> Properties dialog window, Figure 54, opens.

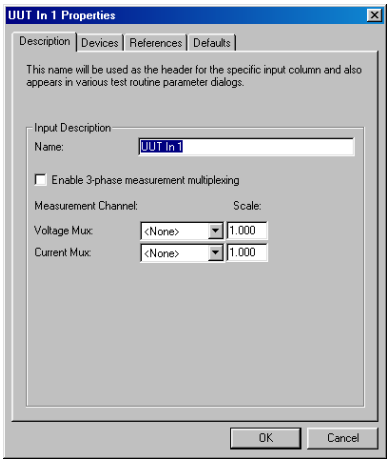


Figure 54 – The <input name> Properties dialog window

The <input name> Properties dialog window opens showing four tabs, with the Description tab on top. These four tabs contain the same fields/settings shown by the dialog windows opened by the Assistant.

See also:

1. **Assistant dialog window 4 – Input Description (page 19)**
2. **Assistant dialog window 5 – Input Devices (page 21)**
3. **Assistant dialog window 6 – Input References (page 23)**
4. **Assistant dialog window 7 – Input Defaults (page 24)**

Task 5 – Deleting an Input Container

Deleting an Output, or Digital Container follows the same method as deleting an Input Container.
In this example I'm using the Test Program created in the *emPower* ® Quick Start Guide, which has the single Input named: +48 VDC Input.

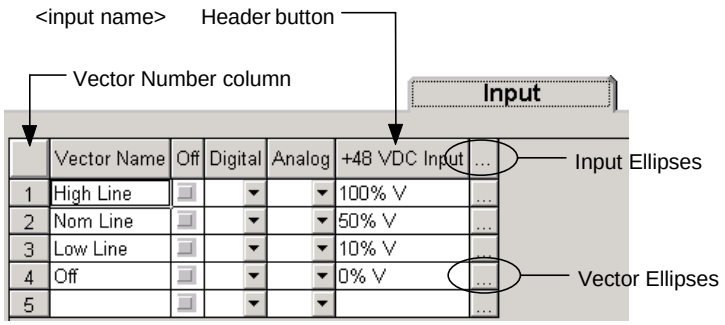


Figure 55 – A Test Program Input tab

With the *EDIT*/Input tab open:

Right-click the <input name> Header button – the Edit menu opens.
Select the Delete option – the EDIT - Confirm delete dialog window, Figure 56, opens.

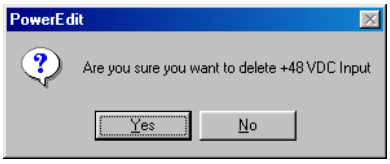


Figure 56 – The EDIT – Confirm delete dialog window

Click the Yes button – the selected Input is deleted.

Task 6 – Re-ordering Input Containers

Reordering Output Containers follows the same method as reordering Input Containers.

Let's assume you created the Input tab in Figure 57, and (for some reason) you decide that the Input Containers must be reordered: +24 Volts, +48 Volts.

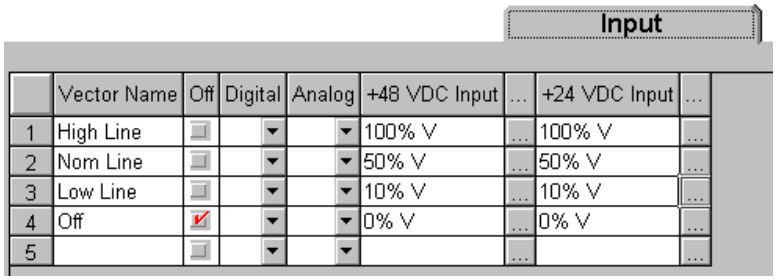


Figure 57 – A Test Program Input tab

Right-click the <input name> Header button labeled +48 VDC Input – the Edit menu, Figure 58, opens.

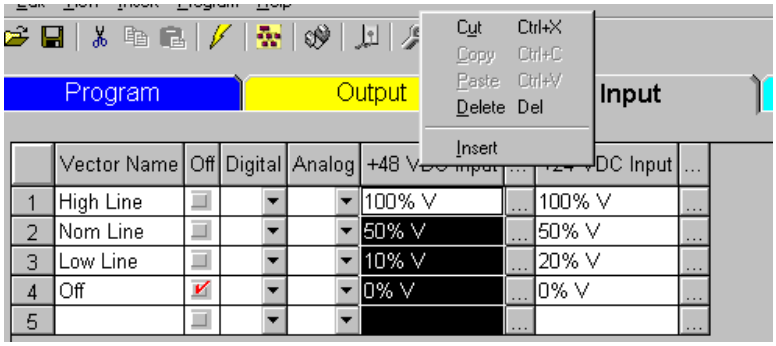


Figure 58 – A Test Program Input tab (cut Input)

Select the Cut option – the +48 VDC Input column is highlighted.
Right-click the <input name> Header button labeled +24 VDC Input – the Edit menu, Figure 59, opens.

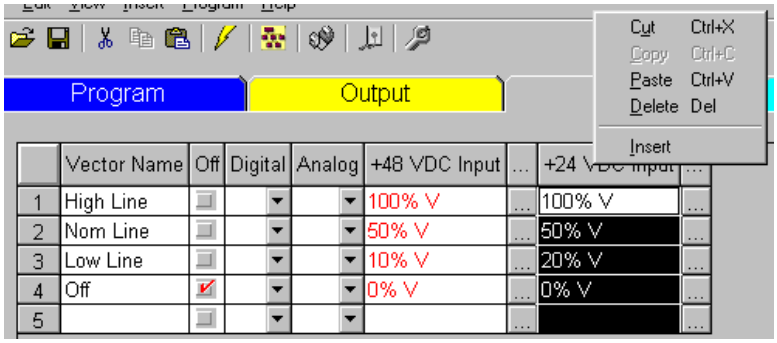


Figure 59 – A Test Program Input tab (paste Input)

Select the Paste option – the +48 VDC Input column is pasted after the +24 VDC Input column, Figure 60.

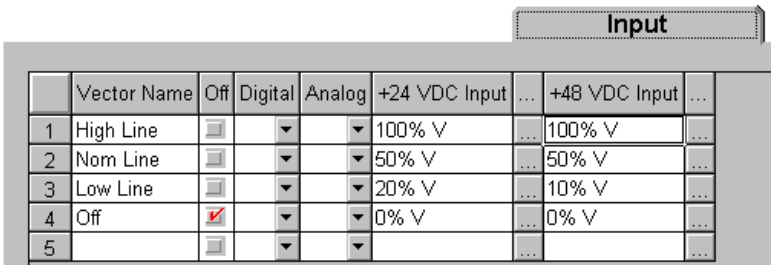


Figure 60 – A Test Program Input tab (Inputs reordered)

Task 7 – Making "No Change" Input Vectors

Sometimes it's helpful to be able to define vectors that have fields that don't change from their current value when they're applied. This can be accomplished by deleting the value from the grid – hitting Backspace or Delete until the characters are removed from the cell. In the following example, the +24 VDC Input will not change its value when either the "High Line" or "Low Line" vectors are applied.

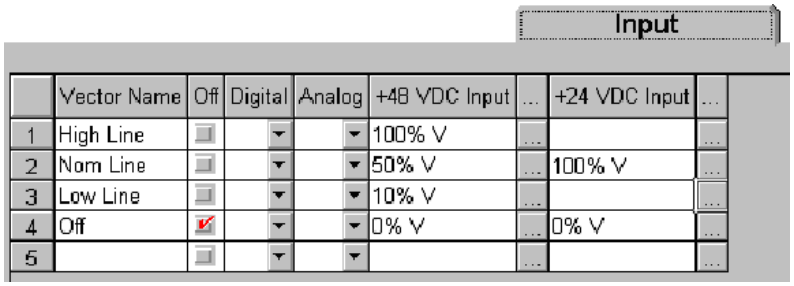


Figure 61 – A Test Program Input tab (No Change Vectors)

To restore the original value in the cell, press the ellipsis button to the right of the empty cell and press OK. The test program remembers the previous value before it was deleted so you don't have to.

You can define No Change Vectors for Output Containers and Analog Containers as well as Input Containers. Digital Vectors have "no change" capabilities built-in to the vector data (see page 68).

6. THE EDIT/INPUT TAB

A reminder – in **Power**Speak:

- The rows you add to the EDIT tabs: Input, Output, Digital, Analog, and Measure are called Vectors
- The columns you add to the EDIT tabs: Input, Output, and Digital are called Containers

In the Input tab, the rows are Input Vectors, and the columns are Input Containers.

The EDIT/Input tab has one task unique to it that needs to be described by itself. That task is:

Task 8 – Designating an existing Input Vector as an Off Vector

Naming an Input Vector "Off" is not what makes it an Off Input Vector. An Input Vector becomes an Off Input Vector **ONLY** when you check the checkbox in the Off column of the EDIT/Input tab, Figure 62.

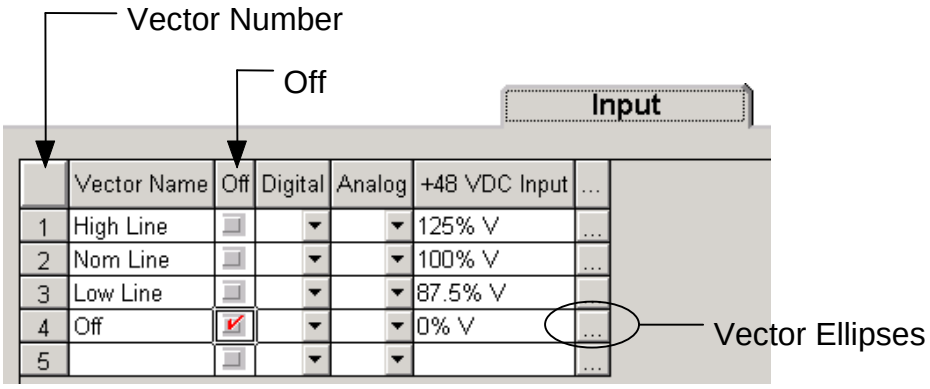


Figure 62 – The EDIT/Input tab

By designating a Input Vector as an Off Input Vector, you are telling *emPower*® to use the values/settings in the Input Preference dialog window, Figure 63.

The values/settings in the Input Preferences dialog window will **ONLY** be used/referred to for Input Vectors with a checked Off checkbox.

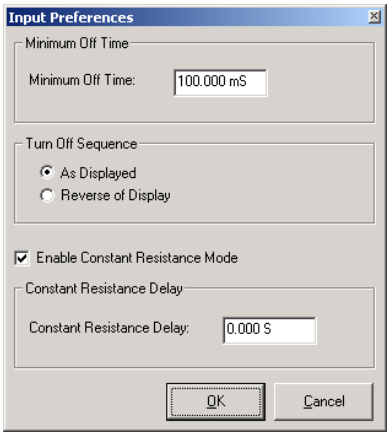


Figure 63 – The Input Preferences dialog window

The Minimum Off Time frame

When turned off, some UUTs require being off for a specified minimum time. Checking an Input Vector's Off checkbox, and entering this specified minimum off time in the Minimum Off Time field, is the most efficient way of ensuring that the UUT is off for at least the specified minimum off time.
The minimum off time is applied at the change between an Off Input Vector, and a **NOT** Off Input Vector. The timer that keeps track of how long an Off Input Vector is actually Off, is a smart timer. When *emPower*® is ready to make the change between an Off Input Vector, and **NOT** Off Input Vector, it "looks" at the value in the Minimum Off Time field, and "asks" the smart timer how long the Off Input Vector has been Off. For example:

1. If the value in the Minimum Off Time field is 100 milli-seconds, and the smart timer's value is 110 milli-seconds – *emPower*® will immediately move to the **NOT** Off Input Vector.
2. If the value in the Minimum Off Time field is 110 milli-seconds, and the smart timer's value is 100 milli-seconds – *emPower*® will wait another 10 milli-seconds before moving to the **NOT** Off Input Vector.

Note: The value entered in the Minimum Off Time field, will only be used (between Input Vectors) if:

1. The Off Input Vector has its Off checkbox checked.
2. *emPower*® is moving from an Off Input Vector, to a **NOT** Off Input Vector.
3. The Off Input Vector hasn't been off for longer than that already.

The Turn Off Sequence frame

By default, all hardware devices in an Input Vector are set to their values/settings (left-to-right) in the order they are displayed in the EDIT/Input tab. Turning off hardware devices – (reversing order of turn on).
Usually, all the hardware devices in an Off Input Vector are delivering no power, and when *em**Power*** ® moves into an Off Input Vector these hardware devices are turned off (by default) in the order (left-to-right) they are shown in the EDIT/Input tab.

In this case, selecting the Reverse of Display option means that these hardware devices will be turned off in the reverse of default order (right-to-left).

It is often true that hardware devices require be turning on in one order, and turning off in the reverse order, that is what the Reverse of Display option allows you to do.

Turning on hardware devices – (reversing default order)

For an Input Vector to be designated an Off Input Vector, it is **NOT** necessary that all hardware devices in that Input Vector are delivering no power. In that case, checking the Off checkbox of that Input Vector is designating that Off Input Vector (which is not really off) as a "special" Off Input Vector.

In this case, selecting the Reverse of Display option means that these hardware devices will be turned on in the reverse of default order (right-to-left).

The Constant Resistance Mode checkbox

In Constant Resistance Mode, the current drawn from your UUT (by a Load) is proportional to the voltage supplied by your UUT.
Checking the Enable Constant Resistance Mode checkbox ensures that *em**Power*** ® moves the UUT from an Off Input Vector to a **NOT** Off Input Vector in the "nicest" way possible by stopping the Load from drawing more current from the UUT than it can "comfortably" supply. The Load tracks the voltage supplied by the UUT, and only draws the level of current proportional to that voltage.
However, although *em**Power*** ® is in Constant Resistance Mode, it is still "intending" to raise the current drawn by the Load to the value specified in the **NOT** Off Input Vector. To do this in Constant Resistance Mode will take some time that is unknown by us.

Let's look at the Constant Resistance Delay field assuming that your UUT needs 2 seconds in Constant Resistance Mode to get to a specified current draw (say 2 amps.) in the **NOT** Off Input Vector.

The Constant Resistance Delay field

The value entered in the Constant Resistance Delay field is the length of time *em**Power*** ® will keep your **NOT** Off Input Vector in Constant Resistance Mode, before letting the Load draw its full (specified) current.

If your UUT "needs" 2 seconds in Constant Resistance Mode to raise the current drawn by the Load to the value specified in the **NOT** Off Input Vector, and you enter 1 second in the Constant Resistance Delay field. After that 1 second in Constant Resistance Mode, the Load will (as quickly as it can) begin drawing the full 2 amps.

If you enter 3 seconds in the Constant Resistance Delay field. After 2 seconds in Constant Resistance Mode, the Load will be drawing the full 2 amps, but *emPower*® will continue in Constant Resistance Mode for another 1 second.

See also:

1. Opening the Input Preferences dialog window (page 60).

Opening the Input Preferences dialog window

With EDIT running -

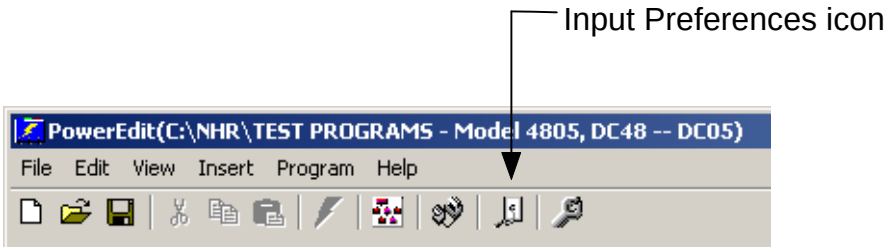


Figure 64 – The Input Preferences icon

Click the Input Preferences icon in the EDIT icon bar – the Input Preferences dialog window, Figure 65, opens.

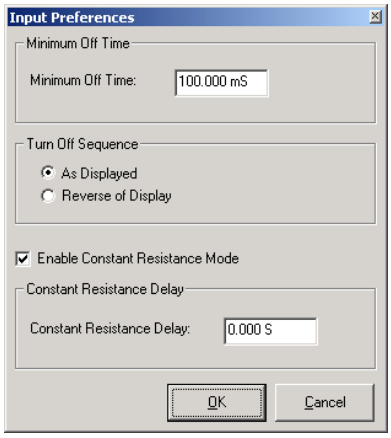


Figure 65 – The Input Preferences dialog window

7. THE EDIT/OUTPUT TAB

A reminder – in **Power**Speak:

- The rows you add to the EDIT tabs: Input, Output, Digital, Analog, and Measure are called Vectors.
- The columns you add to the EDIT tabs: Input, Output, and Digital are called Containers

In the Output tab, the rows are Output Vectors, and the columns are Output Containers.

Deleting an Output Vector -

Deleting an Output Vector follows the same method as: Deleting an Input Vector (page 49).

Re-ordering an Output Vector -

Re-ordering Output Vectors follows the same method as: Re-ordering Input Vectors (page 51).

Deleting an Output Container -

Deleting an Output Container follows the same method as: Deleting an Input Container (page 53).

Re-ordering an Output Container -

Re-ordering an Output Container follows the same method as: Re-ordering Input Containers (page 54).

Making “No Change” Output Vectors -

Making “No Change” Output Vectors follows the same method as: Making “No Change” Input Vectors (page 55)

8. THE EDIT/DIGITAL TAB

A reminder – in **Power**Speak:

- The rows you add to the EDIT tabs: Input, Output, Digital, Analog, and Measure are called Vectors.
- The columns you add to the EDIT tabs: Input, Output, and Digital are called Containers.

In the Digital tab, the rows are Digital Vectors, and the columns are Digital Containers.

8.1 Creating Digital Containers in the EDIT/Digital tab

Adding Digital Containers to your Digital Vectors allows the Digital Vectors to send a signal to a UUT, or Relay. A High/Low signal would be sent to a pin on the UUT, and a Closed/Open signal would be sent to a Relay.

Let's assume that:

1. We plan to supply the specified nominal input voltage to our UUT.
2. Our UUT has an Output Enable pin.
3. Our UUT will only supply its specified nominal output voltage when +05 Volts DC is applied to the Output Enable pin (and the UUT is supplied with its specified nominal input voltage).

We will first create a Digital Container, and name it Enable Pin, then create two Digital Vectors.

The +05 Volts DC will be supplied to the Output Enable pin by a Source controlled by these two Digital Vectors we will create. We need to create two because we need one to "tell" the Source to supply the +05 Volts DC, and one to "tell" the Source **NOT** to supply the +05 Volts DC (together they act like an on/off switch).

Digital Container 1 – Creating the Digital Container named Enable Pin

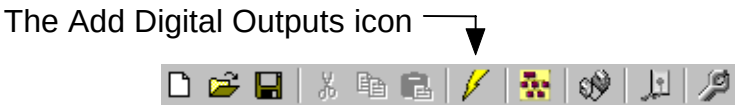


Figure 66 – The EDIT icon bar (Add Digital Outputs) icon

With the EDIT/Digital tab open, the icon indicated in Figure 66, is labeled Add Digital Outputs. Click the Add Digital Inputs icon in the EDIT icon bar, Figure 66 – the <container name> Properties dialog window (Configuration tab), Figure 67, opens.

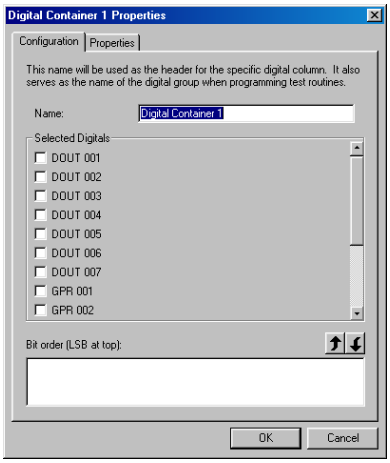


Figure 67 – The <digital container name> Properties dialog window (Configuration tab)

Enter Enable Pin in the Name field.
Check the DOUT 001 (Digital Out) checkbox – DOUT 001 appears in the Bit order list box.

See also: The Bit order list box (page 67) for more information
Click the OK button – your EDIT/Digital tab should appear as Figure 68.

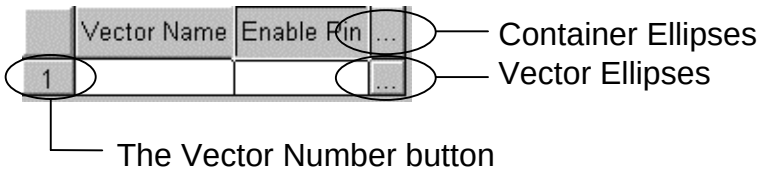


Figure 68 – The EDIT/Digital tab

The Digital Container (the column) named Enable Pin is now created. Now we need to create the two Digital Vectors.

Deleting a Digital Container

Deleting a Digital Container follows the same method as: Deleting an Input Container (page 53).

Re-ordering Digital Containers

Re-ordering Digital Containers follows the same method as: Re-ordering Input Containers (page 54)

8.2 Creating Digital Vectors in the EDIT/Digital tab

Digital Vector 1 – Creating the Digital Vector: Enable Output.

Double-click the Vector Number 1 button – a default Digital Vector labeled Default1, is added to the spreadsheet with an Enable Pin Digital Container with the default value of x for DOUT 001 – for now let's leave it with that value.

See also:

Select, by single-clicking, the label Default1.
Enter the new label Enable Output – your EDIT/Digital tab will appear as in Figure 69

	Vector Name	Enable Pin	...
1	Enable Output	x	...
2			...

Figure 69 – The EDIT/Digital tab (one vector)

Digital Vector 2 – Creating the Digital Vector: Disable Output

Double-click the Vector Number 2 button – a default Digital Vector labeled Default2, is added to the spreadsheet with an Enable Pin Digital Container with the default value of x for DOUT 001 – for now let's leave it with that value.

Select, by single-clicking, the label Default2
Enter the new label Disable Output – your EDIT/Digital tab will appear as in Figure 70.

	Vector Name	Enable Pin	...
1	Enable Output	x	...
2	Disable Output	x	...
3			...

Figure 70 – The EDIT/Digital tab (two vectors)

Now, since we are going to:

1. Use the Digital Vector named Enable Output to set the Enable Output pin on the UUT to High – effectively turning on the UUT.

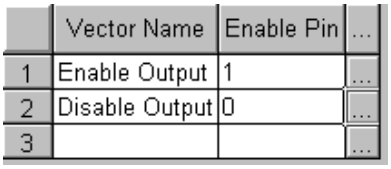
Set the Vector Value of this Digital Container to 1 (1 is the High state for a DOUT) – instructions on page 70

and

2. Use the Digital Vector named Disable Output to set the Enable Output pin on the UUT to Low – effectively turning off the UUT.

Set the Vector Value of the Digital Container named DOUT 001 to 0 (0 is the Low state for a DOUT) – instructions on page 70.

Then your EDIT/Digital tab will appear as in Figure 71.



	Vector Name	Enable Pin	...
1	Enable Output	1	...
2	Disable Output	0	...
3			...

Figure 71 – The EDIT/Digital tab (Digital Container High/Low)

You can now use these Digital Vectors in either the:

EDIT/Program tab
EDIT/Output tab
EDIT/Input tab

8.3 Deleting a Digital Vector

Deleting a Digital Vector follows the same method as: Deleting an Input Vector (page 49).

8.4 Re-ordering Digital Vectors

Re-ordering Digital Vectors follows the same method as: Re-ordering Input Vectors (page 51).

The <digital container name> Properties dialog window (Configuration tab).

The Bit order list box

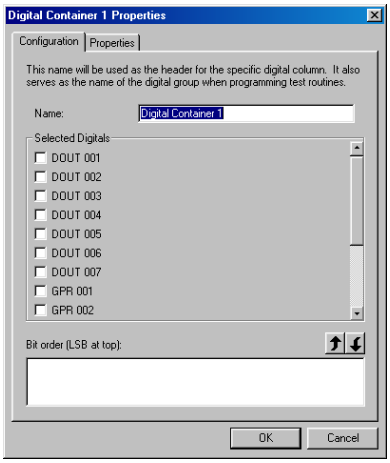


Figure 72 – The Digital Container 1 Properties dialog window

In **Power**Speak the term Bit doesn't mean an 1/8 of a Byte, but rather a part of a Digital Container: DOUT 001..DOUT 007, GPR 001..G PR 008.

Each Digital Container can contain many Digital Outputs (DOUTs), and General Purpose Relays (GPRs).

Each Bit will appear in the Bit order list box in the order the checkboxes are checked.

Reordering the Bits of a Digital Container

By default, the Bits of a Digital Container appear in the Bit order list box in the same order as they appear in the Selected Digitals frame. You may change this order to suit your own needs.

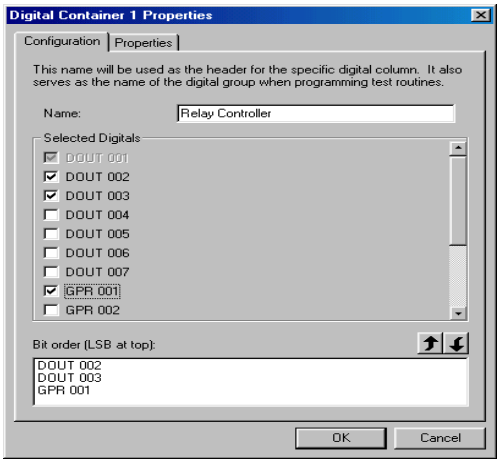


Figure 73 – The Relay Controller Properties dialog window

Assuming that you have checked: DOUT 002, DOUT 003, and GPR 001 as shown in Figure 73 (DOUT 001 is disabled because it is being used by another Digital Container), and (for some reason) you want to list them in the Bit order: GPR 001, DOUT 003, DOUT 002. To do that:

Select, by single-clicking, GPR 001 in the Bit order list box.
Click the up-arrow twice – the Bit order is now: GPR 001, DOUT 002, DOUT 003.
Select, by single-clicking, DOUT 003.
Click the up-arrow once – the Bit order is now: GPR 001, DOUT 003, DOUT 002, as in Figure 74.

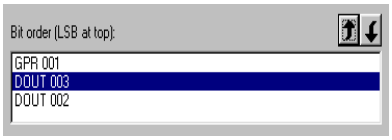


Figure 74 – The Bit order list box (close up) **The <digital container name> Properties dialog window (Properties tab)**

In the Bit order list, Figure 73, the order of the Bits is set by you, with the Most Significant Bit (MSB) at the bottom of the list. In Figure 75 the value entered in the Default Vector Value field is a Bit pattern that corresponds to the order Bits listed in the Bit order list box, Figure 73, and is listed with the Most Significant Bit (MSB) on the left.

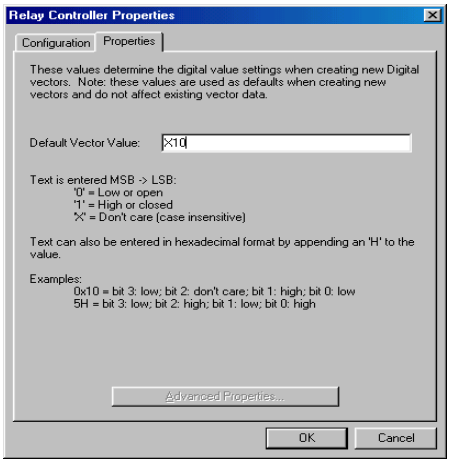


Figure 75 – The <digital container name> Properties dialog window (Properties tab)

In the <digital container name> Properties dialog window (Properties tab), Figure 75, you need to enter a Bit value in the Default Vector Value field for each Bit in the Bit order list box of the <digital container name> Properties dialog window (Configuration tab). The Bit value options are: 0, 1, X or x (case insensitive), the meaning of these Bit values is:

0 – set a DOUT to Low, set a GPR to Open.
1 – set a DOUT to High, set a GPR to Closed.
X – leave the DOUT or GPR as it is.

By specifying a Bit pattern in the Default Vector Value field, you are actually "telling" TEST what to do to each Bit of the Digital Container as it is loaded by a Digital Vector.

Figure 76 shows close-ups from the two tabs of the <digital container name> Properties dialog window. The Bit order list box close-up is from the Configuration tab, and the Vector Value field close-up is from the Properties tab.

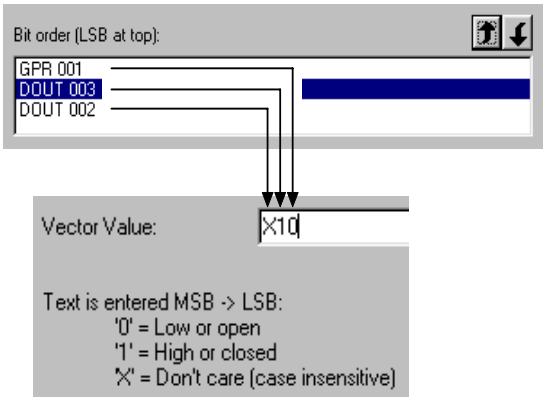


Figure 76 – The Bit order & Vector Value field box (close up) What the two close-ups in Figure 76 show is how the Bit order in the Bit order list box ties in with the Bit pattern entered in the Vector Value field. What the Bit pattern is saying is "when the Digital Container is loaded":

GPR 001 – "set me to Open".
DOUT 003 – "set me to High".
DOUT 002 – "leave me as I am" .

Entering a Bit pattern in the Vector Value field in Hexadecimal notation.

You may also enter the Bit pattern value in the Vector Value field in Hexadecimal notation. These Hexadecimal values are converted internally to their Binary representation, for example (assuming 4 Bits):

1. If you wanted all the DOUT Bits to be Low, and the GPR Bits to be Open in the Digital Container you would enter: 0H – which would convert to the Binary: 0000 although you would only every see 0H.
2. If you wanted all the DOUT Bits to be High, and the GPR Bits to be Closed in the Digital Container you would enter: FH – which would convert to the Binary: 1111 although you would only every see FH.

Changing the Vector Value of a Digital Container

In the EDIT/Digital tab

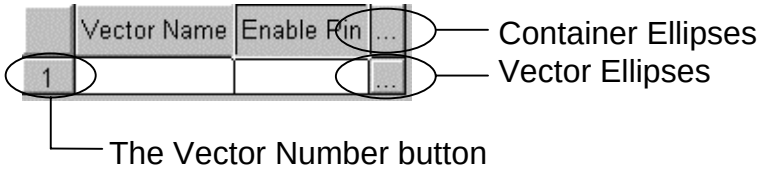


Figure 77 – The EDIT/Digital tab

Click the Vector Ellipses of the Digital Container you want to change the Vector Value of – the <digital container name> Properties dialog window, Figure 78, opens.

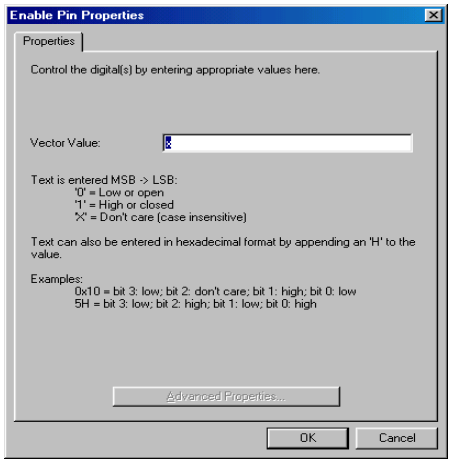


Figure 78 – The Enable Pin Properties dialog window

In the Vector Value field:

Change the Vector Value to the value you want – one character for each DOUT, and GPR in the Digital Container.
Click the OK button.

9. THE EDIT/ANALOG TAB

A reminder – in **Power**Speak:

- The rows you add to the *EDIT* tabs: Input, Output, Digital, Analog, and Measure are called Vectors

In the Analog tab, the rows are Analog Vectors, the columns are Analog Devices.

The EDIT/Analog tab is (in general) for controlling hardware devices that do not have their own EDIT tab (and specifically) for controlling Function Generation devices.

Adding an Analog Vector -

Adding an Analog Vector follows the same method as: Adding an Input Vector (page 48).

Deleting an Analog Vector -

Deleting an Analog Vector follows the same method as: Deleting an Input Vector (page 49).

Re-ordering Analog Vectors -

Re-ordering Analog Vectors follows the same method as: Re-ordering Input Vectors (page 51).

Adding an Analog Device -

Figure 79 – The EDIT icon bar (Add New Inputs) icon

With the Output tab open, the icon indicated in Figure 79, is labeled Add Analog Object.

Click the Add Analog Object icon – the Analog Device dialog window, Figure 80, opens.

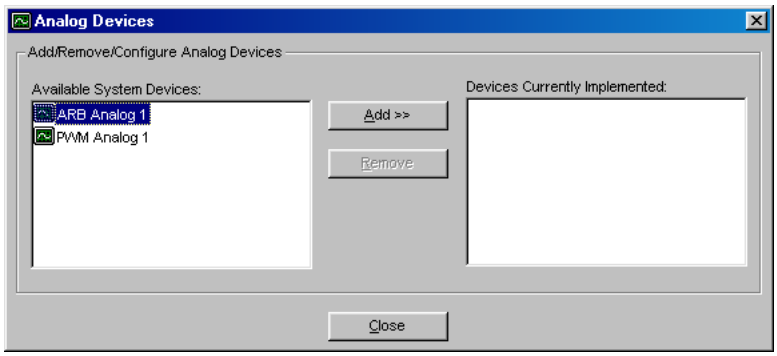


Figure 80 – The Analog Device dialog window The Analog Devices that appear in the Available System Devices list box depends on what Analog Devices exist in your Current Configuration file (see the *emPower*® Utilities Reference Manual – NHR Configurator for more information).

Select, by single-clicking, the Analog Device you want to add to the Analog tab.
Click the Add >> button – the selected Analog Device is added to the Devices Currently Implemented list box.
Click the Close button – the Analog Device is added to the Analog tab.

Deleting an Analog Device

Deleting an Analog Device follows the same method as: Deleting an Input Container (page 53).

10. THE EDIT/MEASURE TAB

Every new Test Program you create, is created with the blank *EDIT*/Measure tab shown in Figure 81.

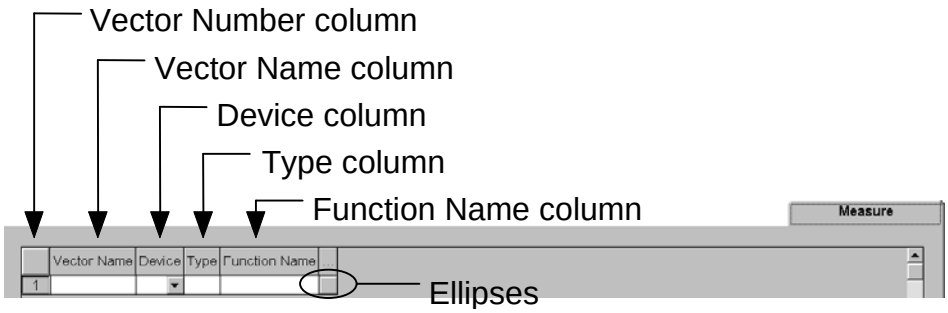


Figure 81 – The EDIT/Measurement tab

10.1 The Measure tab columns

The Vector Name column

The field in the Vector Name column is where you enter a descriptive name for the Measurement Vector. This is a text label, and has now effect on the Test Program.

The Device column

The dropdown in the Device column is where you select which UUT Input or Output you want to measure, or the description of an actual measurement device. What appears in this list depends on what Inputs & Outputs (created by someone) exist in your Test Program, and what actual devices are listed in the Current Configuration file of your Test Program.
In the Test Program created in the *emPower* ® Quick Start Guide, which uses the demonstration configuration file: Demo.cfg, and has a single Input named: +48 VDC Input, and a single output named: +05 VDC Output the devices that appear in the list are shown in Figure 82.

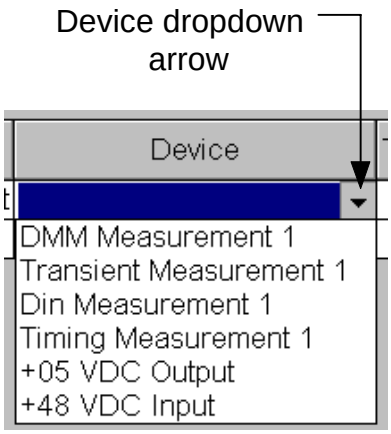


Figure 82 – The Device column dropdown

The Type column
The entry in the Type column is auto-filled by *emPower*® and depends on the selection you make from the Device column dropdown.

The Function Name column

When you click the Ellipses button, Figure 81, of a Measurement Vector, a device dependant <device name> Properties dialog window opens. Which <device name> Properties dialog window will open, depends on the selection you made in the Device column.

10.2 Setting up a Measurement Vector

Assuming that you have a blank Measure tab, Figure 83, and Demo.cfg is your Current Configuration file.

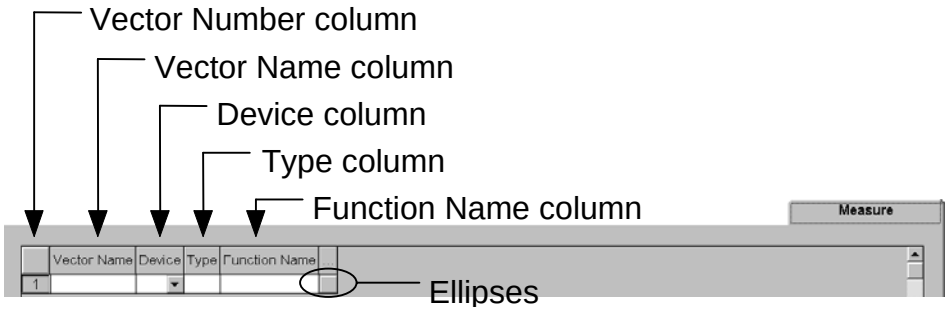


Figure 83 – The EDIT/Measurement tab

Here's how you set up a Measurement Vector:

Step 1 – Adding a blank Measurement Vector

Double-click the first number in the Vector Number column – the Vector Name cell is filled with a default label, and a blank line is added to the bottom of the spreadsheet.

Double-click the Default Vector Name label, and change it to Input DCA.

Double-click the Vector Name, Column Header button – the column resizes to fit the label (this method works with all Column Header buttons).

Step 2 – Selecting a Device for the Measurement Vector

Resize the Device column to about three times its current width, by grabbing-and-dragging the right-hand-side of its Column Header button, in the standard spreadsheet fashion.

Click the Device dropdown arrow – the list of available devices appears, Figure 84.

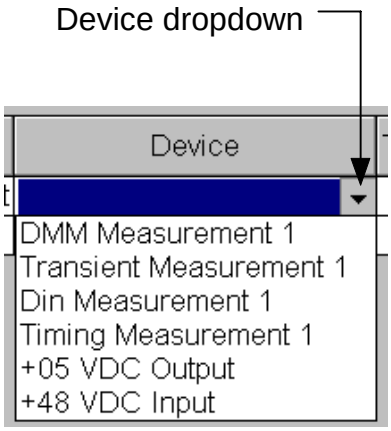


Figure 84 – The Devic*e* dropdown

Select +48 VDC Input – the field in the Type column is auto-filled.
Double-click the Type, Column Header button to resize the column.

Step 3 – Selecting a Measurement Function

Click the Ellipses at the end of the row – the +48 VDC Input Properties dialog window opens, Figure 85.

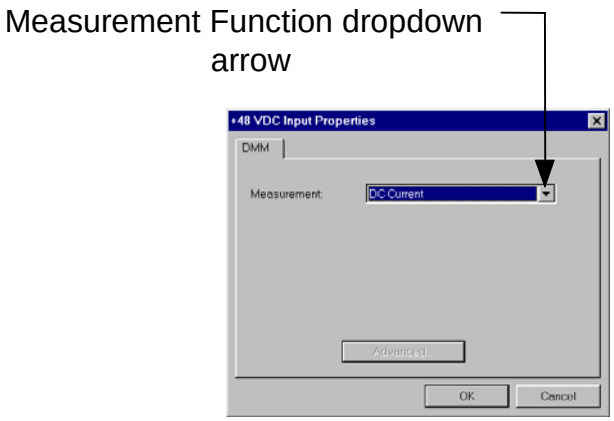


Figure 85 – The +48 VDC Input Properties dialog window

In the Measurement Function dropdown select DC Current.
Click the OK button – the Measurement Vector is complete.

	Vector Name	Device	Type	Function Name	..
1	Input DCA	+48 VDC Input	Source	DC Current	...
2					

Figure 86 – The Measure tab (one Measurement Vector)

Deleting a Measurement Vector

Deleting a Measurement Vector follows the same method as: Deleting an Input Vector (page 49).

11. THE EDIT MENUS

Figure 87 – The EDIT menu bar

11.1 The Program menu

The Test Information Prompt dialog window

Before TEST runs a Test Program, the default Test Information Prompt dialog window, Figure 88, is opened. See the TEST Reference Manual for information on running a Test Program.

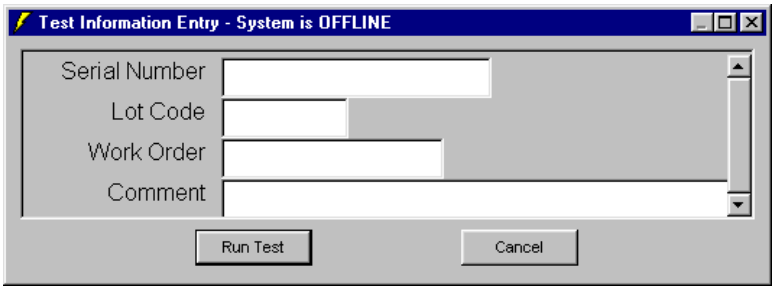


Figure 88 – The Test Information Prompt dialog window

The information you enter in the fields of the Test Information Prompt dialog window are sent to all Datalog Drivers except the screen Datalog Driver.

11.2 Configuring the default fields of the Test Information Prompt dialog window

Open the Test Information Configuration dialog window, Figure 89, – see Opening the Test Information Configuration dialog window (page 81) for instructions.

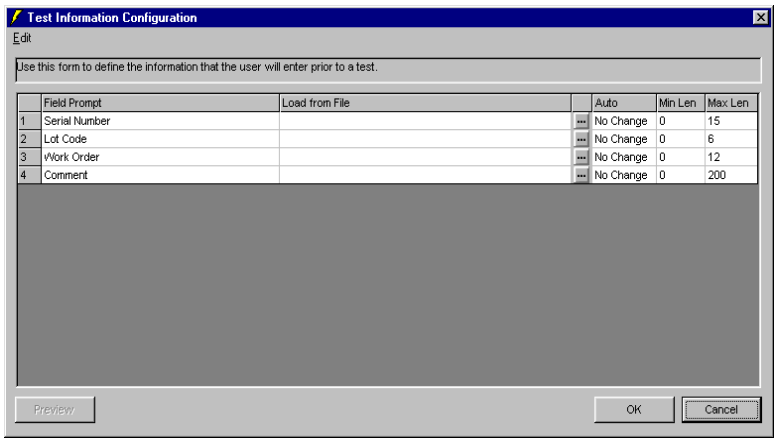


Figure 89 – The Test Information Configuration dialog window

Changing the label in the Field Prompt column

Open the Test Information Configuration dialog window, Figure 89, – see Opening the Test Information Configuration dialog window (page 81) for instructions.

In the Test Information Configuration dialog window:
Double click the label in the Field Prompt column that you want to change – the label is highlighted.
Enter the new label – the label is changed.

Loading a field from a file

Rather than having The Operator enter a value/string in a field of a Test Information Prompt dialog window each time a UUT is tested, you can load a value/string from a plain text file into the field. To do that:

Left-click the Load from File ellipses – the Windows Open dialog window, Figure 90, open.

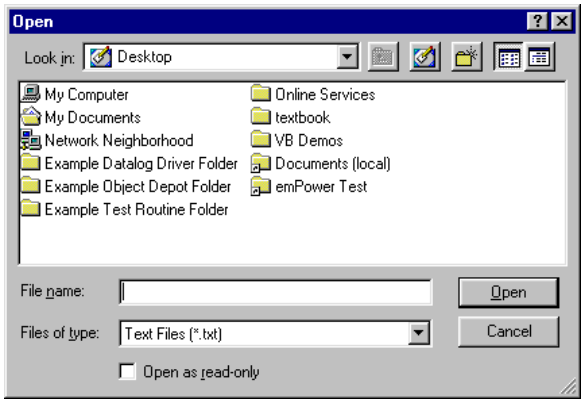


Figure 90 – The Windows Open dialog window

Browse to the folder containing the file you want to use.
Select, by single-click, the file you want to use.
Click the Open button – the field in the Load from File column shows the path to the selected plain text file.

If you load a value/string from a plain text file into the field, The Operator cannot change this value, and it cannot be automatically incremented for each UUT tested, since it is re-loaded for each UUT tested.

Making a selection in the Auto column

In the Auto column there are four options, they are:

No Change (the default) – whatever The Operator enters in the field of the Test Information Prompt dialog window, will remain the same for each UUT tested.

Clear (the opposite of No Change) – whatever The Operator enters in the field of the Test Information Prompt dialog window, will be cleared for each UUT tested.

Increment – any numerical value The Operator enters in the field of the Test Information Prompt dialog window will be automatically incremented for each UUT tested.

Read Only – The Operator cannot enter anything in the field of the Test Information Prompt dialog window.

More on automatically incrementing a field

The code that automatically increments the value/string entered in a field of the Test Information Prompt dialog window, is smart code. In the Test Information Prompt dialog window, the value entered in an automatically incrementing field doesn't have to be an integer. It can be a mixed string of characters, and only the last integer in the mixed string gets incremented – for example:

The initial value: 12348, would increment through:

12349, 12350, 12351 ….

The initial value: NHR-12345-ACDC, would increment through:

NHR-12349-ACDC, NHR-12350-ACDC, NHR-12351-ACDC …

The initial value: PS-12345-AC123, would increment through:

PS-12345-AC124, PS-12345-AC125, PS-12345-AC126 …

If the automatically incrementing field contains no integer value, an integer will be added, and incremented, for example:

The initial value: NHR-ACDC, would increment through:

NHR-ACDC1, NHR-ACDC2, NHR-ACDC3 …

Setting the minimum number of characters for a field.

If you set a value for the minimum number of characters for the fields of the Test Information Prompt dialog window, the Test Program cannot be run until The Operator enters at least that number of characters in that field. If you set the minimum number of characters for Serial

Number field to 5, when the Test Information Prompt dialog window opens it will look like Figure 96 with the Serial Number label bold.

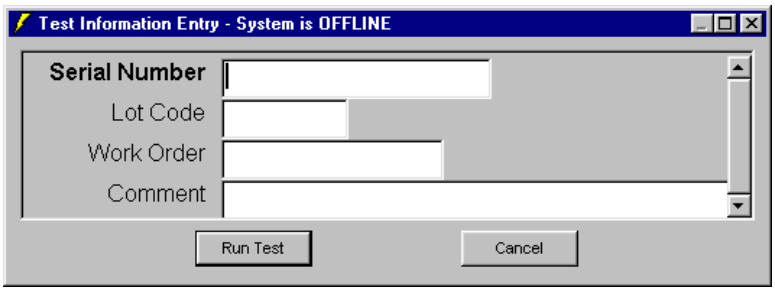


Figure 91 – The Test Information Prompt dialog window If The Operator enters fewer characters in the Serial Number field, and clicks the Run Test button, then the Data Entry Error dialog window, Figure 92, opens.

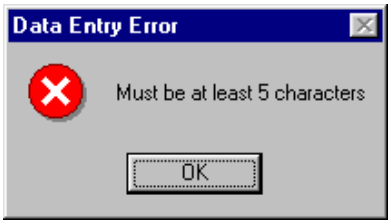


Figure 92 – The Data Entry Error dialog window

Setting the maximum number of characters for a field

If you set a value for the maximum number of characters for the fields of the Test Information Prompt dialog window the fields are resized, and will not accept more characters than the value entered for the maximum. Figure 93 shows the Serial Number field with a minimum of 5, and a maximum of 7.

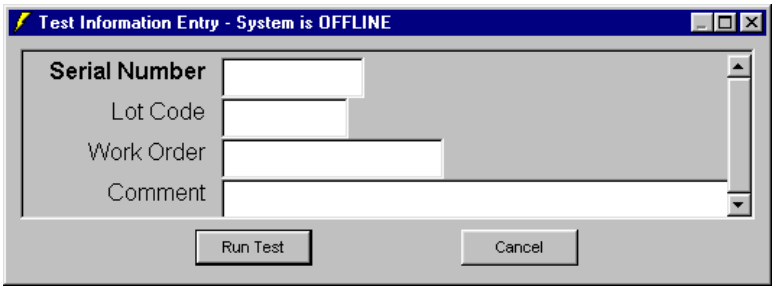


Figure 93 – The Test Information Prompt dialog window

11.3 The Test Information Configuration File menu

Opening the Test Information Configuration dialog window

In the EDIT menu bar:

Left-click Program – the Program menu, Figure 94, opens.

Figure 94 – The Program menu

Left-click Settings… – the *em**Power*** ® – Program Settings dialog window, Figure 95, opens.

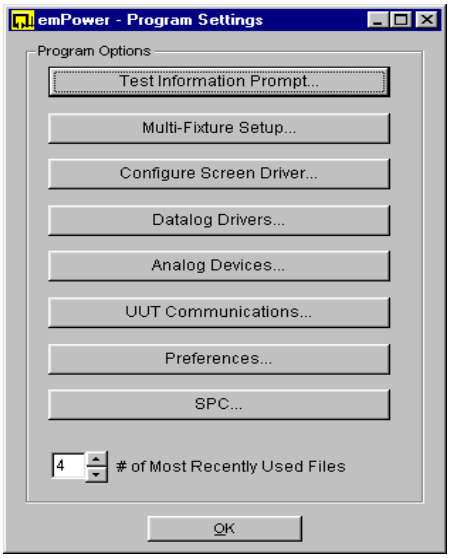


Figure 95 – The *emPower*** ® **Program Settings dialog window**

Left-click the Test Information Prompt button – the Test Information Configuration dialog window, Figure 96, opens.

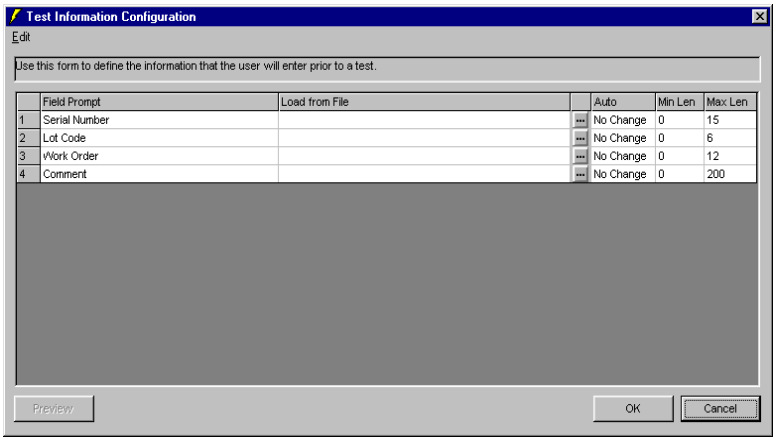


Figure 96 – The Test Information Configuration dialog window

In the Test Information Configuration dialog window, Figure 96, the four rows shown correspond to the four fields in the Test Information Prompt dialog window, Figure 97.

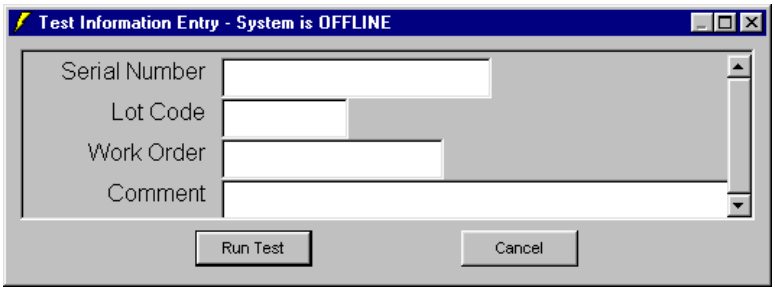


Figure 97 – The Test Information Prompt dialog window

12. APPENDIX

12.1 Starting *emPower* ®

Step 1 – The computer's desktop icon
The *emPower* ® shortcut icon below, should be on your computer's desktop:

Figure 98 – The *emPower* ® desktop icon

Double-click the icon to start *emPower* ® – what happens next depends on whether *emPower* ® is being started, and Logged on to for the first time or not.

Step 2 – Logging on – the first time
If you double-clicked the *emPower* ® desktop icon, and the Administrator Log On dialog window, Figure 99, opens; you are starting *emPower* ® for the first time.
The Administrator Log On dialog window is warning you that as the first user to Logon to em*Power* ® you will automatically receive the highest user level of Administrator.

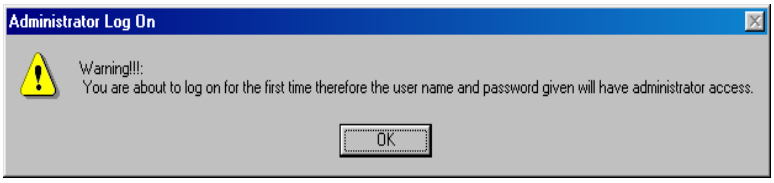


Figure 99 – The Administrator Log On dialog window

Click the OK button – the Logon dialog window, Figure 100, open.

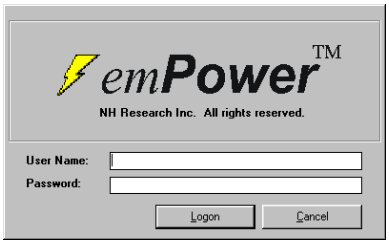


Figure 100 – The first Logon dialog window

In the User Name entry box, type-in an appropriate Username for yourself.
Click the Logon button – the Set User Password dialog window, Figure 101, opens.

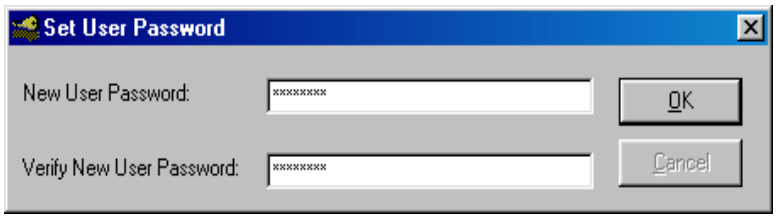


Figure 101 – The Set User Password dialog window

Enter an appropriate Password in the New User Password: field.
Re-enter the same Password in the Verify New User Password: field.
Click the OK button – you are now logged on to *emPower*® with the User Level of Administrator.

Step 2 – Logging on – not the first time
In this case the Logon dialog window, Figure 102, opened after you double-clicked the *emPower*® desktop icon.
You should already have an *emPower*® User Name, and Password. If not see your own system administrator.

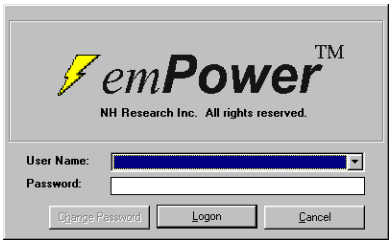


Figure 102 – The Logon dialog window

Select your Username from the list in the User Name dropdown.
Enter your Password, in the Password: field.

Click the Logon button – *emPower* ® will start, showing the full screen image, Figure 103.

Figure 103 – The *emPower* ® screen

Step 3 – Starting EDIT

Figure 104 – The *emPower* ® toolbar

12.2 Key concepts, and terms

Most concepts and terms in this guide are called out and explained when they are first mentioned, but there are a few that you need to know before going any further, they are:

- UUT – Unit Under Test, in this document our UUT is a DC-DC converter.
- Off-Line Testing – The running of an *emPower* ® Test Program on a computer with simulated hardware interaction.
- Input – Where the UUT gets its power from.
- Output – Where the UUT's output goes.
- Nominal – The normally expected value.
- Vector – A Vector is a snapshot of a device state. This snapshot contains the settings of that device at a specific point in the run of a Test Program. The *emPower* ® system has: Input Vectors, Output Vectors, Digital Vectors, Analog Vectors, and Measurement Vectors.

- Primary Value – The main component of a Vector. The Primary Value for Input Vectors is always Reference Voltage, and the Primary Value for Output Vectors is combination of the Output Mode plus Reference Value for that Output Mode (this is chosen/set by you) – more on this later.

12.3 The EDIT spreadsheets

- The rows you add to the spreadsheets in the EDIT tabs: Input, Output, Digital, Analog, and Measure are called Vectors.

- The columns you add to the spreadsheets in the EDIT tabs: Input, Output, and Digital are called Containers.

12.4 The formatting of entered values

The input fields in *emPower*® accept values in a range of decimal and Engineering Notation formats.

Examples:

1. If 48 volts is required, you may enter either: 48v, 48, 0.048kv, or 0.048k etc.
2. If a 100 milli-second delay is required, you can enter: 100m, 100ms, 0.1s, or 0.1 etc.

Letter	Units	Decimal Notation	Engineering Notation
p or P	pico	0.000000000001	1E-12
n or N	nano	0.000000001	1E-9
u or U	micro	0.000001	1E-6
m (case sensitive)	milli	0.001	1E-3
k or K	kilo	1,000	1E3
M (case sensitive)	mega	1,000,000	1E6
g or G	giga	1,000,000,000	1E9

Table 1 – Formats for values

12.5 Predefined Labels and Vector Names

To help create consistent names across multiple test programs, emPower has the ability to read external files that contain predefined Program Labels and Vector names. The files reside in C:\NHR\Default Labels, and have names reflecting the emPower section that will use it. For example, default Program tab Labels are read from a file named “Program.txt”; Output Vector names are read from “Output.txt”, and so forth.

The files are simple text lists, and can contain comments by preceding the comment text with a semicolon (;). Here is an example of a Program Label text file (Program.txt):

```
; Sample file containing pre-defined labels for the EDIT Program tabs
;(includes pre/post & on pass/fail/abort)
;

1.0 Power Up
2.0 Set Point Accuracy
3.0 Regulation                      ; Regulation tests
3.1 Low-line/Full Load Regulation
3.2 High-line/Full Load Regulation
4.0 Efficiency                      ; Efficiency tests
4.1 Low-line Efficiency
4.2 High-line Efficiency
4.3 Energy Star Efficiency
5.0 Noise                           ; Noise tests
5.1 RMS Noise
5.2 Peak-Peak Noise
6.0 Protection                      ; Protection tests
6.1 Overcurrent Protection
6.2 Overvoltage Protection
6.3 Short Circuit Protection
```

Here is an example of an Input Vector text file (Input.txt):

```
; Sample file containing pre-defined labels for the EDIT Input tab

Off
Low Line
Nom Line
High Line
```

The whitespace between the end of the label text and the semicolon is ignored. By default, the files do not contain any definitions – you can add whatever text is appropriate for your business.

The text fields are presented as drop-down text in the Label or Vector Name fields. The fields remain editable, so you can also manually enter text that is not in the file (although this text will not be transferred into the predefined list).

INDEX

Error! No index entries found.