

USING LINE SYNC WITH UPC STUDIO

Abstract

This application shows a step by step procedure for using the Pacific Power Source Universal Programmable Controller (UPC) and the UPC Studio software in a Line Sync or External Sync mode of operation. Syncing the output of an AC Power Source to the public utility grid or an external Sync signal supports testing of AC switching equipment such as transfer switches under various carefully controlled conditions.

Introduction

UPC Studio provides quick and easy control over the basic functions of a Pacific Power Source AC Power Source. Presets for 50, 60, and 400Hz are provided for most common applications. Form, Coupling, Current Limit, Voltage, and Waveforms are all easily accessed from this single easy to use soft panel.

While there are no specific dedicated control windows that support the SYNC mode of operation, it is quite easy to operate in this mode using the UPC Studio software by following the steps outlined in this application note. Using the 'Probe' feature, discrete commands can be sent to the controller to enable, disable, and adjust the Line Sync options.

Controlling Sync Mode Operation

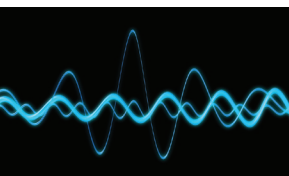
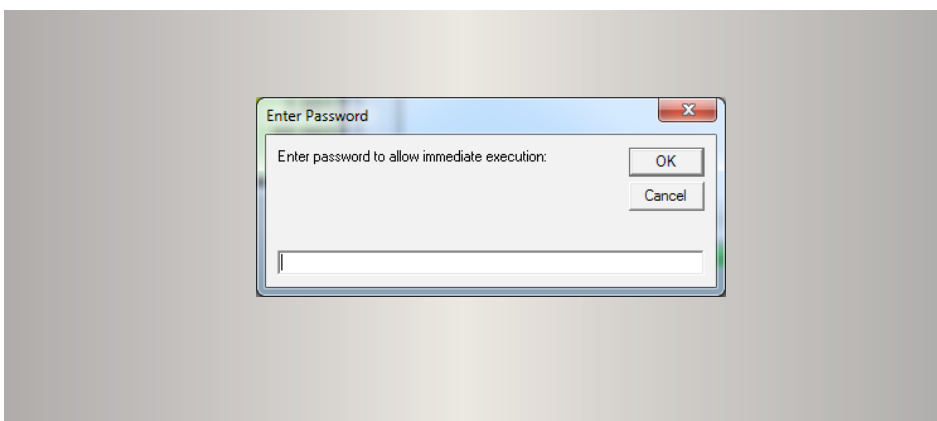
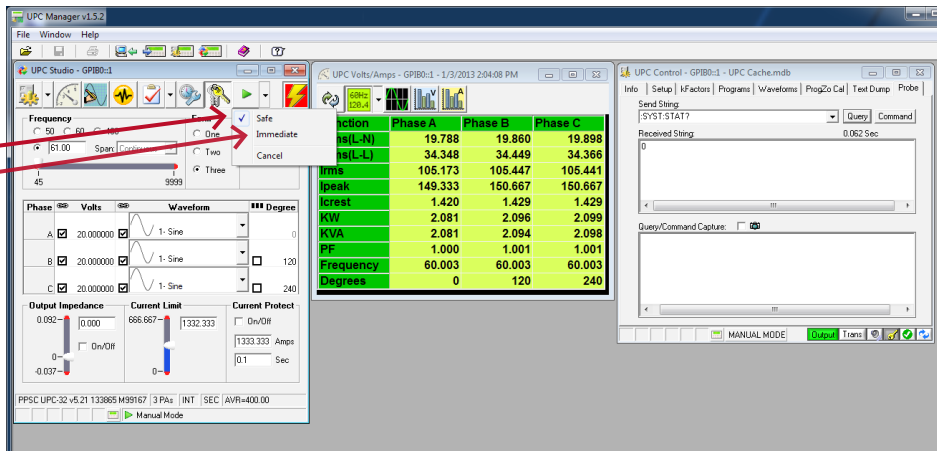
Since Programs and Output Sequences are not available when FSYNC and/or VSYNC are enabled. To work around this, we need to change the operating mode of the Manual Control window from "Safe" to "Immediate".

To change the Execute control button to "IMMEDIATE" mode, click the down arrow next to the Green Execute Settings Button and select "Immediate".

A window will open asking for a password. This ensures the control mode is not changed by accident but rather on purpose, as any changes to the steady state output of the AC Power Source take immediate effect in this mode of operation.

Enter the word DANGER in all capital letters and click on the "OK" button. This will place the Manual Mode window into IMMEDIATE

WARNING: When operating UPC Studio in IMMEDIATE mode any changes to the manual values (i.e. frequency, voltage, waveform, current limit, etc.) will have an immediate effect on the Power Source's output. For example, when a voltage value is entered into the manual field and the ENTER key is pressed the output will immediately change to the new voltage.



FREQUENCY CONVERSION

AEROSPACE

R & D

MILITARY

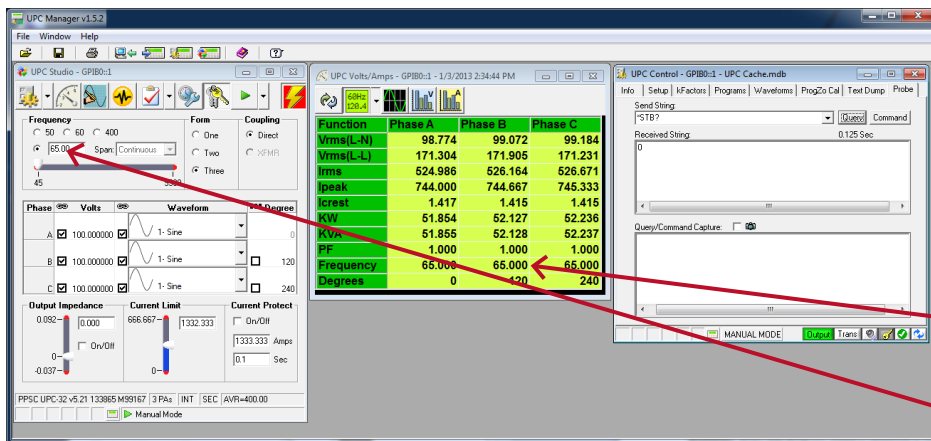
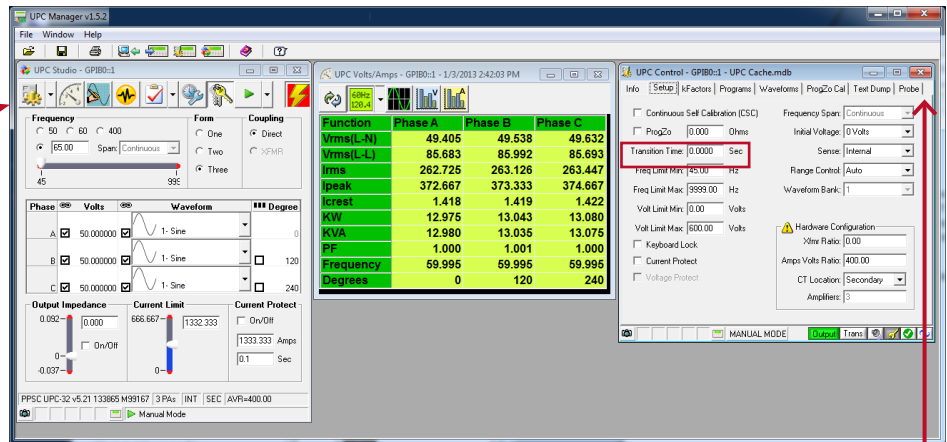
MANUFACTURING

CUSTOM

Once in Immediate mode, changes to output voltage are accomplished by UPC Studio with direct voltage commands rather than writing to Program 0 when in 'SAFE' mode. When FSYNC is active, manual voltage commands are possible in the UPC Studio window, but Output Sequences are NOT available.

Note: When using Line Sync the Transition Time must be set to 0.0000 otherwise the power source will show an error message.

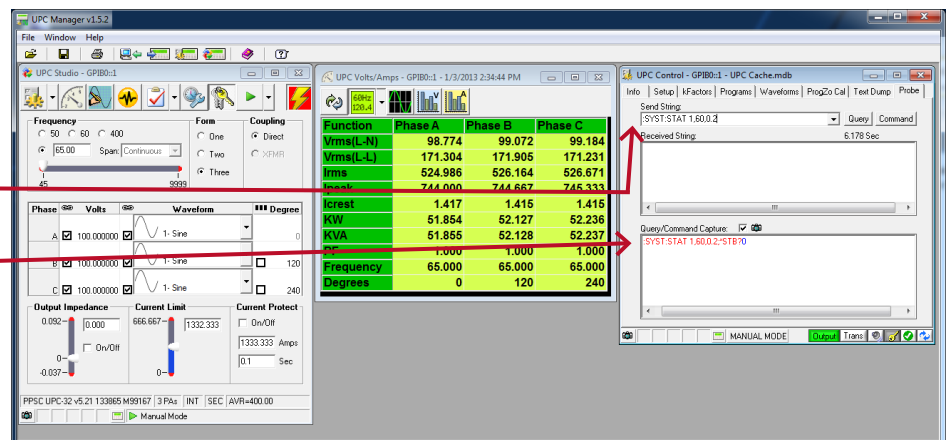
To enter the manual commands needed to control the Line Sync mode, the UPC Studio 'Probe' function will be used. The Probe function can be found by pressing the UPC Control button and then the 'Probe' Tab.



Please refer to the Line Sync Manual Addendum (P/N 133620/673-M2) for a complete list of commands. For this example we will use an output voltage of 100V^{L-N} and a target frequency of 60Hz. To demonstrate the power source synchronizing with the mains frequency we will set the output frequency to 65Hz to start:

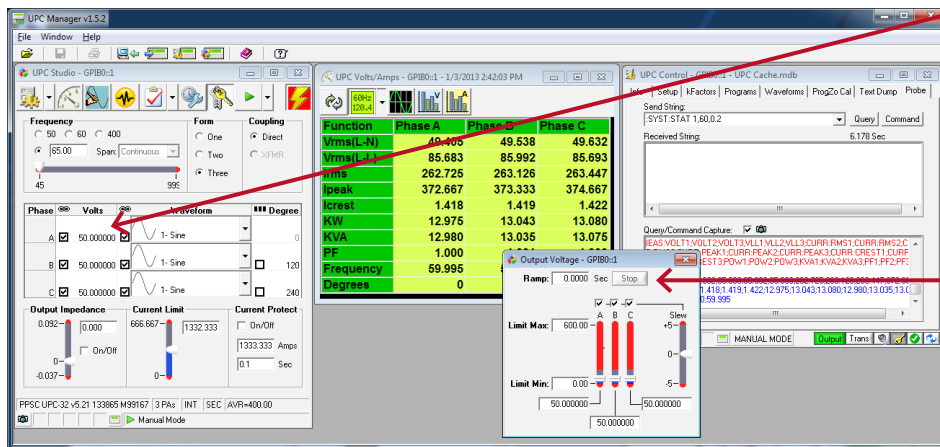
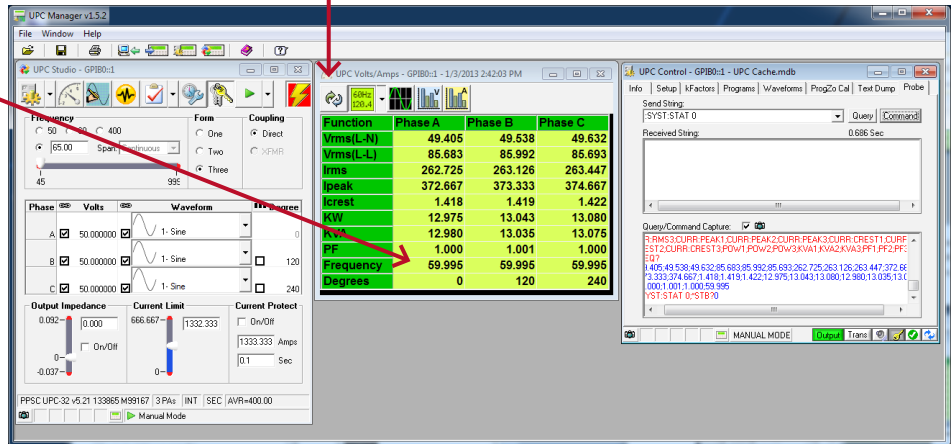
Next we will send a command to the power source to enable FSYNC with a target frequency of 60Hz and a tolerance of 20%. To perform this we will type in the text "SYST:STAT 1,60,0.2" in the 'Send String:' box and then press the 'Command' button.

Please note that we enabled the 'Query/Command Capture' check box to see the commands and responses from the power source.



Pressing the refresh button we can now see that the actual output frequency is 59.99Hz:

Because the Execute Settings is set to 'Immediate' we can also change the output voltage in the manual window. For this example we'll change the output voltage to 50Vac and refresh the metering window to see the change in output voltages:

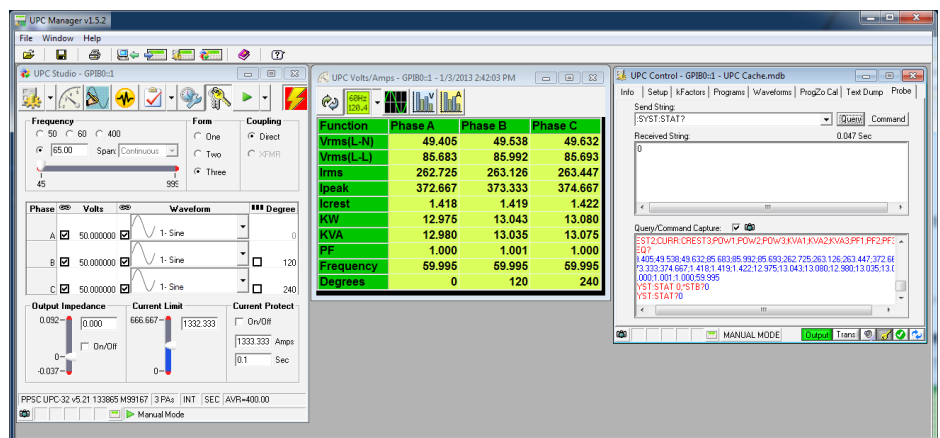


UPC Studio also has a 'Slew' feature when in 'Immediate' mode which enables the user to 'Slew' the voltage up and down faster and slower depending upon where the slew key is. To bring up the Slew Window simply right click in one of the voltage cells. When you right click in the voltage cell the following window will open:

Using the 'Slew' slider you can increase or decrease the output voltage so long as you hold the slider above or below 0Vac, respectfully.

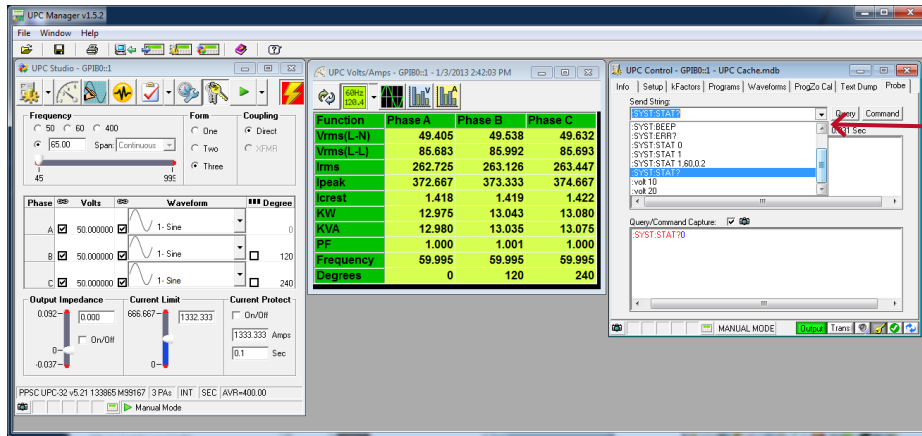
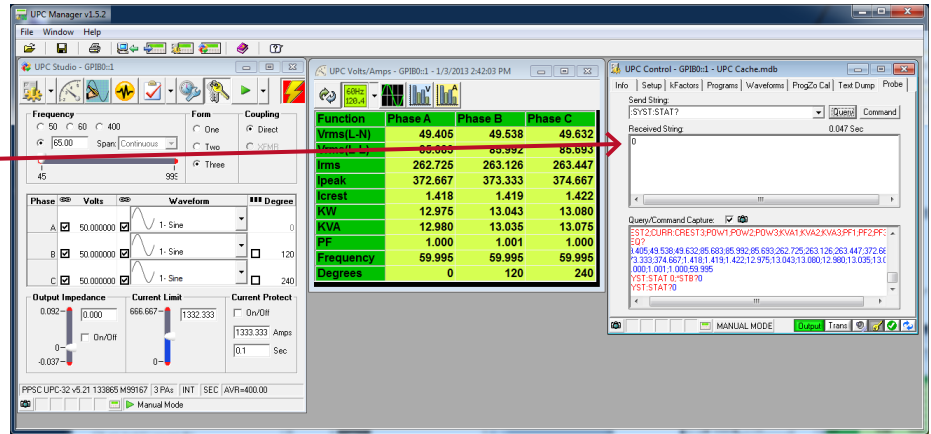
(Note: "RAMP" must be set to 0.0000)

To disable FSYNC simply send the command ":SYST:STAT 0" in the 'Send String' box and press the Command button:



You can also check the status of Line Sync by entering the command “:SYST:STAT?” into the ‘Send String’ box and pressing the ‘Query’ button as follows:

A value of ‘0’ in the Received String box indicates that Line Sync is disabled.



The Send String field remembers your previous commands so you can quickly access them by pressing the down arrow to the right of the field:

This way you don't have to reenter the commands each time. You can also select a command and edit it before pressing the Query or Command buttons.

Summary

The UPC Controller offers many advanced features such as the Line Sync capability described in this application note. Using the UPC Studio software, these features can easily be controlled to meet specific application requirements. For more information on these and other advanced capabilities of the Pacific Power Source product line, contact one of our Application engineers or your local Pacific Power Source representative.