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**Excel Workbook**  
**Control**  
**For**  
**GPTR**



## Introduction

The GPTR (Programmable 3Phase Grid Generator and Load Simulator) consists of 6 synchronous generators and a Grid Analyzer(see [description](#)). The generators can be programmed in frequency (common to every one of them), relative phase (respect to the phase1 grid generator) and amplitudes, independently of each other.

The Excel workbook "GPTR\_Command.xls" contains a sheet named "GPTR" that has the layout shown in the next figure, to facilitate the control of these generators as well as to present some of the data read by the Grid Analyzer.

The VBA code in this Excel workbook is provided as an appendix with the purpose of acting as a introduction to programming the GPTR. This code uses a specific DLL (ACM\_GPTR\_v1.DLL) that takes care of the low level control details of the COM port used to communicate with the GPTR. Using this code as is or as starting point, the user can develop other applications such as: automating calibration of devices, datalogging, etc.

The chosen User Interface is divided between "specific worksheet cells" and a set of graphical widgets (buttons, labels, checkboxes, etc), as can be appreciated in next figure.

	A	B	C	D	E	F	G	H	I	J	K	N
	Variable	Values	Units	Phase angle	Relative Phase Angle	cosFi	Active Power	Reactive Power	Ramp Up	Ramp Down	Units	Grid Analyzer reading
1												
2	V1	390	V	0					120	50	V/cycle	0
3	V2	390	V	120					120	50	V/cycle	0
4	V3	390	V	240					120	50	V/cycle	0
5	All together	390	V									
6												
7	I1	500	A	45	45	0,7071	137.886	137.886	120	50	A/cycle	0
8	I2	500	A	165	45	0,7071	137.886	137.886	120	50	A/cycle	0
9	I3	500	A	285	45	0,7071	137.886	137.886	120	50	A/cycle	0
10	All together	500	A	All together	45		413.657	413.657				
11												
12												
13	Frequency	50	Hz									0,0
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												

Sheet values <> GPTR Internal values

Calibrate    Store parameters in GPTR    GPTR Reset

Generators Offline    Grid Analyzer Offline

Connect to GPTR    COM1     Extended User

"Normal" user interface

The cells and group of cells surrounded by a dark border are cells that can be modified by the user.



The cells with a red triangle at the upper right corner allow the control of the values of the cell immediately above, as a convenience way to change their values at once.

The column "Grid Analyzer values" present the values of the actual reading of the Grid Analyzer inside the GPTR.

The desired values to be impressed on the GPTR generators are typed in in the corresponding worksheet's cells. The big button actually send these values to the GPTR. Whenever there is some to be sent (i.e. some value in a cell does not match the corresponding value inside the GPTR), the background of this button turns to red. When all coincide then it turns to grey.

The internal values in the GPTR can be visualize as in the next figure, that also shows the "Extended user Interface" ([Extended user interface](#) and [GPTR internal values](#))

Variable	Values	Units	Phase angle	Relative Phase Angle	cosFi	Active Power	Reactive Power	Ramp Up	Ramp Down	Units	Down Transient coefficients (CTs)	Grid Analyzer reading	GPTR Vs / Is	GPTR Phases	GPTR RSx	GPTR RBx	GPTR CTs		
V1	390	V	0					120	50	V/cycle	10%	391	390	0	120	50	10		
V2	390	V	120					120	50	V/cycle	10%	390	390	120	120	50	10		
V3	390	V	240					120	50	V/cycle	10%	391	390	240	120	50	10		
All together	390	V																	
I1	500	A	45	45	0,7071	137.886	137.886	120	50	A/cycle	10%	503	500	45	120	50	10		
I2	500	A	165	45	0,7071	137.886	137.886	120	50	A/cycle	10%	506	500	165	120	50	10		
I3	500	A	285	45	0,7071	137.886	137.886	120	50	A/cycle	10%	509	500	285	120	50	10		
All together	500	A	All together	45		413.657	413.657												
Duration (TTR)												10							
Frequency	50 Hz												50,0	50					100

Sheet values <> GPTR internal values

Calibrate   Store parameters in GPTR   GPTR Reset

Generators Online   Grid Analyzer Online

Close connection   COM3    Extended User    Periodic test GPTR

```

2: $02RV
03/06/2009 10:56:30:
$0200000039200000039100000039100000039178
03/06/2009 10:56:30: GridAnalyzer OK
03/06/2009 10:56:30: $02RAI
03/06/2009 10:56:30:
                
```

Execute direct command   #01E

Down Transient

### Common understandings

1. Only cells with background color different from white can be changed by the user.
2. Some cells that has a "All together" labels in its left neighbor cell, "force" its value on the three cells above it (voltages, currents, phases). NOTHING HAPPEN TILL YOU PRESS "RETURN" KEY.
3. All the angles for phases are converted to its corresponding value in the 0 to 360 modulus.
4. Any cell with "yellow" or "red" background color indicates either a fault or "not valid value".
5. Red color in the "Generators status" or "Grid Analyzer status" widgets indicates that they are not available. Green color indicates they are.



6. Red color appears as background for the big button whenever at least one cell value does not match the corresponding internal value in the GPTR, meaning that you should press this button in order to "impress" these cells' values into the GPTR.
7. Red color in the "GPTR Reset" appears when the GPTR entered a "trip state": i.e., when at least one of the six generators exceeded the maximum power. The GPTR gets out of this "trip state" only after receiving a "Reset" command. This command is associated to the "GPTR Reset" button, so pressing it at any moment, bring the GPTR to the "reset state", meaning that voltages will go to 0, currents will go to 0, phases will go to (0,120,240 ), the parameters RSx, RBx, CTx, TTR will take the values stored last time that the GPTR received the "Store parameters" command.



## Installation of the product

### *Software*

The GPTR can be controlled via a RS485 line, using ASCII commands (see "GPTR User's Manual"). Alternatively ACM SL supplies a ActiveX DLL ("ACM\_GPTR\_v1.DLL") that ease the control of the unit. It does not require any additional component.

This DLL can be used with any software development environment that supports ActiveX, such as Visual C++, Visual Basic, VBA, etc.

The workbook "GPTR\_Command.xls" uses "ACM\_GPTR\_v1.DLL" for controlling the GPTR unit. I

This help file describe the "cases of use" of this workbook. You can find a full description of the VBA code at the end, so this workbook can serve as teaching tool for the use of the DLL.

A full description of the properties, types and methods is also included at the en.

You can place both files in any directory you wish (i.e. "C:\GPTR").

You MUST REGISTER the "ACM\_GPTR\_v1.DLL": for doing so, you must have administrative permission in the PC. Open a "cmd" screen, go to the directory where this file is placed, and type "regsvr32 ACM\_GPTR\_v1.DLL".

(Remember that if you need to reinstall a DLL you should first unregister the existing version with "regsvr32 -u ACM\_GPTR\_v1.DLL")

If you try to open the "GPTR\_Command.xls" workbook in Excel and the DLL is not registered then you will get a message advising you to do so, and stop the execution of macros.

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### *Hardware*

In order to operate to control the GPTR you need:

1. A comport, either standard or obtained through a USB to RS232 converter.
2. A RS232 to RS485 bidirectional converter.

(IMPORTANT NOTE: We STRONGLY recommend the use of so called "intelligent" converters, such as ICPCON i-7520, as they are able to adapt themselves to any baud rate and to control transparently the who can talk).

The RS485 line is used in half-duplex mode, with only one control master, that is associated to comport opened by the "GPTR\_Command.xls" workbook. That is why we strongly recommend to use a dedicated RS485 line for the GPTR with the "ACM\_GPTR\_v1.DLL".

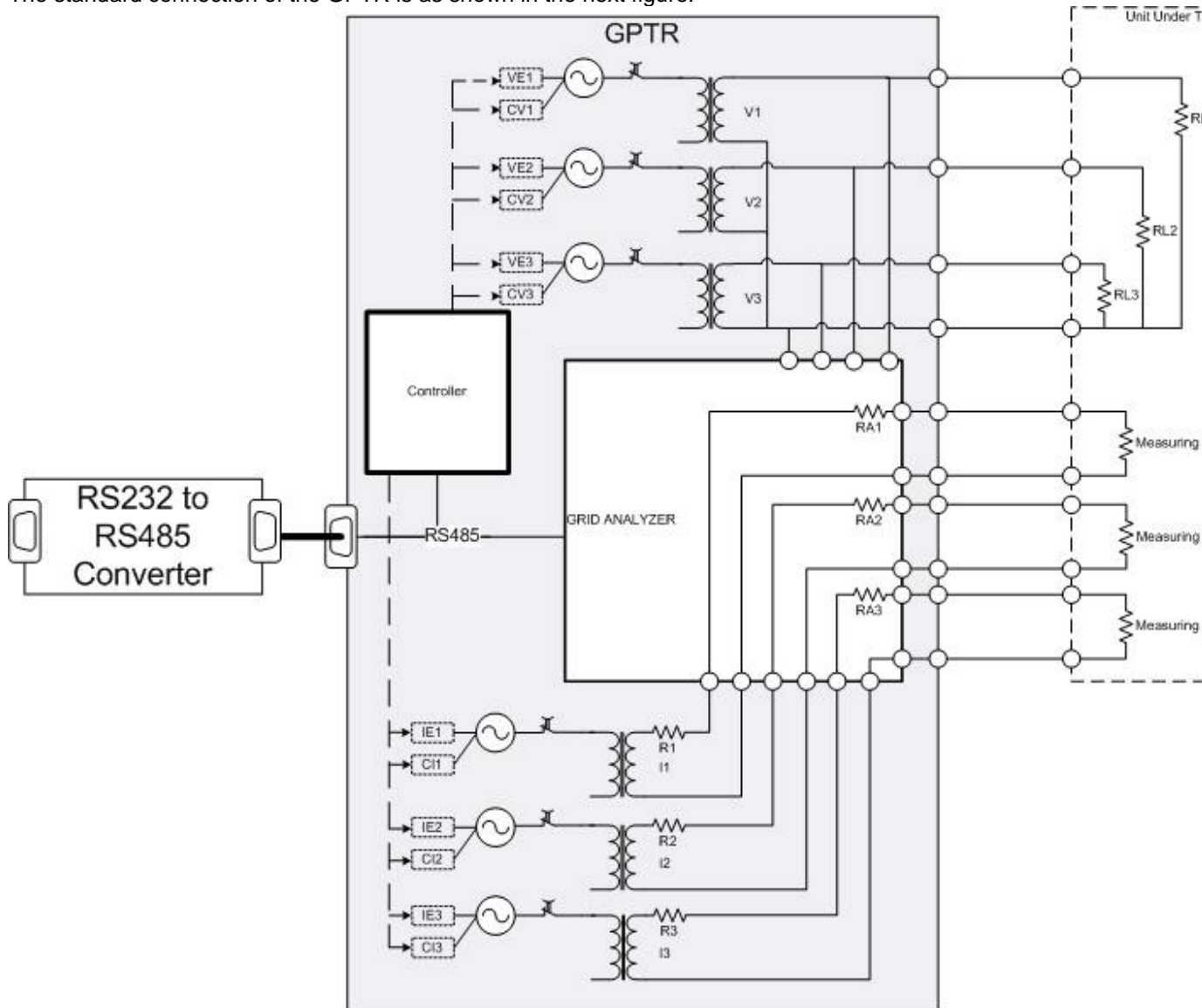


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### Conection

The standard connection of the GPTR is as shown in the next figure.



The values impressed in the voltage outputs are controlled by the setting of the variables "VEx" and the actual internal values for correction ("CVx"). Similarly for the current generators ("IEx" and "CIx" respectively).

The Controller of the GPTR is set to address '01' in the RS485 line. The Grid Analyzer is set (fixed) to address '02' in the same RS485 line.



## Cases of use

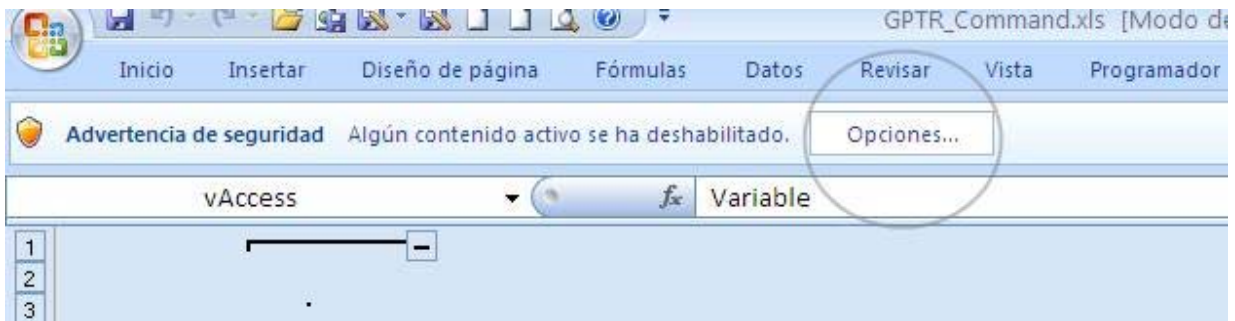
The cells and group of cells surrounded by a dark border are cells that can be modified by the user. The cells with a red triangle at the upper right corner allow the control of the values of the cell immediately above, as a convenience way to change their values at once.

The column "Grid Analyzer values" present the values of the actual reading of the Grid Analyzer inside the GPTR (see connectivity diagram in [Connection](#) )

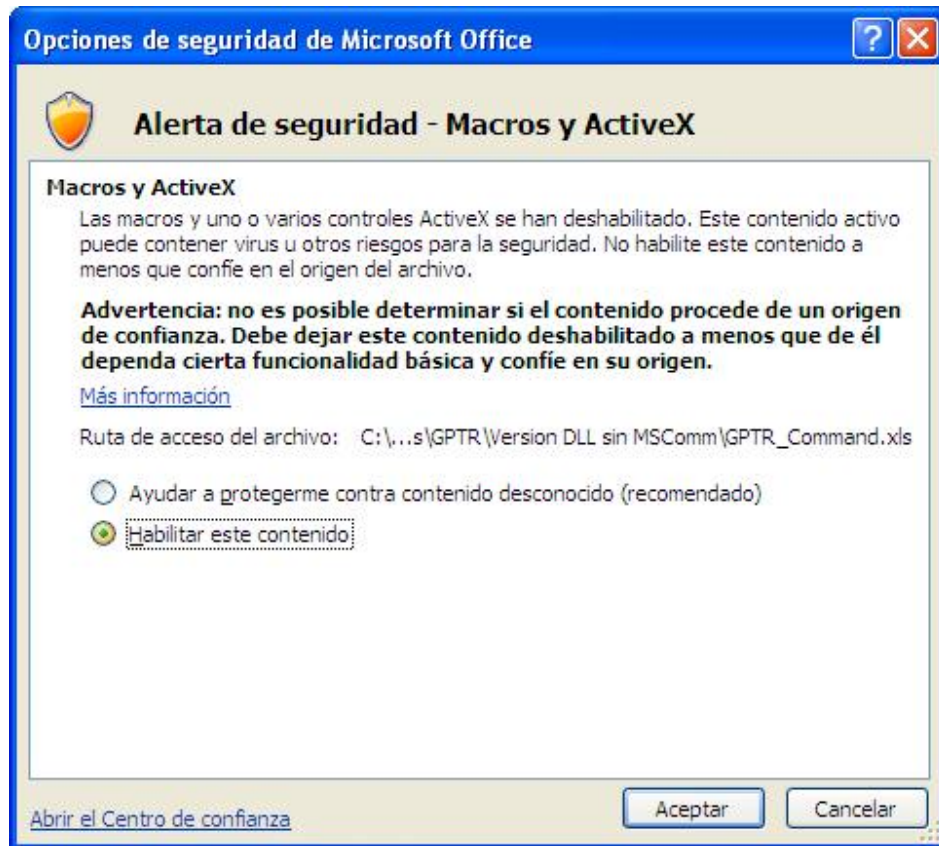
## Starting up

At starting up, Excel will detect that this workbook has a worksheet that contains macros, so it warns the user above getting permission for execute them.

Something similar to the following figure should appear (the next figure is in Spanish):



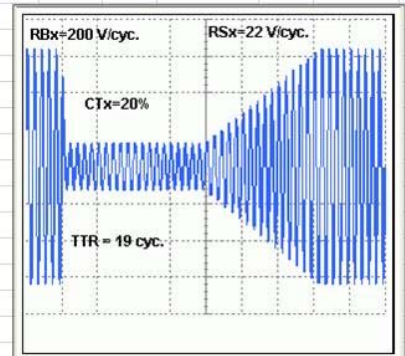
Pressing with the mouse in "Opciones" you will be presented with the following form (or similar):



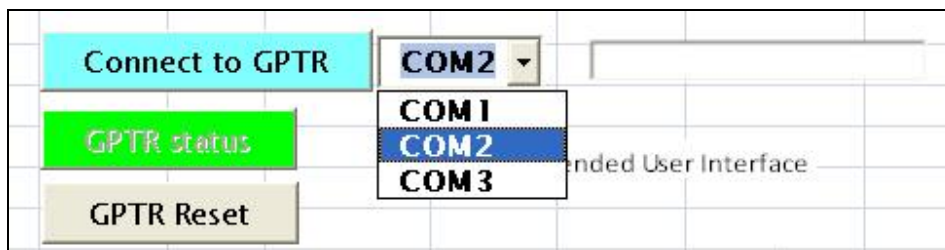
Please check the "Allow" option (as shown), and you will get presented the standard interface, located in worksheet named "GPTR", as shown in the next figure



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
	Variable	Values	Units	Phase angle	Relative Phase Angle	cosFi	Active Power	Reactive Power	Ramp Up	Ramp Down	Units	Down Transient coefficients (CTs)		Grid Analyzer reading
1														
2	V1	390	V	0					120	50	V/cycle	10	%	388
3	V2	390	V	120					120	50	V/cycle	10	%	388
4	V3	390	V	240					120	50	V/cycle	10	%	388
5	All together	390	V											
6														
7	I1	500	A	0	0	1,000	195.000	0	120	50	A/cycle	10	%	498
8	I2	1000	A	120	0	1,000	390.000	0	120	50	A/cycle	10	%	992
9	I3	1000	A	240	0	1,000	390.000	0	120	50	A/cycle	10	%	990
10	All together	1000	A	All together	0	1,000	975.000	0						
11														
12												Duration (TTR)		
13	Frequency	50	Hz									100	cycles	50,0
14														
15		Connect to GPTR		COM2									Down Transient	
16		GPTR status												
17														
18		GPTR Reset												
19														
20														
21														
22														
23														
24														
25														
26														
27														
28														
29														
30														



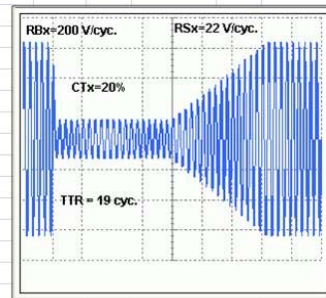
You will notice que button "Connect to GPTR" will be enabled, and that the combobox next to it presents the list of COM ports actually available in your computer. You can check that as in the next figure.



If you select a COM port in which the GPTR is not connected or, being connect is not turned on, and you press the button "Connect to GPTR", you will get a change in the "GPTR Status" button, as shown in the next figure.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	
	Variable	Values	Units	Phase angle	Relative Phase Angle	cosFi	Active Power	Reactive Power	Ramp Up	Ramp Down	Units	Down Transient coefficients (CTs)		Grid Analyzer reading	GPTR Internal Vs / Is	GPTR Internal Phases	GPTR Internal RSx	GPTR Internal RBx	GPTR Internal CTs	
1																				
2	V1	390	V	0					120	50	V/cycle	10	%	387	---	0	---	---	---	---
3	V2	390	V	120					120	50	V/cycle	10	%	388	---	---	---	---	---	---
4	V3	390	V	240					120	50	V/cycle	10	%	387	---	---	---	---	---	---
5	All together	390	V																	
6																				
7	I1	500	A	0	0	1,000	195.000	0	120	50	A/cycle	10	%	498	---	---	---	---	---	---
8	I2	1000	A	120	0	1,000	390.000	0	120	50	A/cycle	10	%	989	---	---	---	---	---	---
9	I3	1000	A	240	0	1,000	390.000	0	120	50	A/cycle	10	%	990	---	---	---	---	---	---
10	All together	1000	A	All together	0	1,000	975.000	0												
11																				
12																				
13	Frequency	50	Hz																	
14																				
15		Close connection		COM2			GPTR 005 77 /1 0.07													
16																				
17		GPTR status																		
18																				
19		GPTR Reset																		
20																				
21																				
22																				
23																				
24																				
25																				
26																				
27																				
28																				
29																				
30																				
31																				



Otherwise (you selected the COM port at which the GPTR is connected and it is turned on and the cables are properly connected and the RS232 to RS485 converted is also connected and powered up) then you will get every properly setup to start controlling the GPTR.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
	Variable	Values	Units	Phase angle	Relative Phase Angle	cosFi	Active Power	Reactive Power	Ramp Up	Ramp Down	Units	Down Transient coefficients (CTs)		Grid Analyzer reading
1														
2	V1	390	V	0					120	50	V/cycle	10	%	388
3	V2	390	V	120					120	50	V/cycle	10	%	388
4	V3	390	V	240					120	50	V/cycle	10	%	388
5	All together	390	V											
6														
7	I1	500	A	0	0	1,0000	195.000	0	120	50	A/cycle	10	%	498
8	I2	1000	A	120	0	1,0000	390.000	0	120	50	A/cycle	10	%	992
9	I3	1000	A	240	0	1,0000	390.000	0	120	50	A/cycle	10	%	990
10	All together	1000	A	All together	0	1,0000	975.000	0						
11												Duration (TTR)		
12												100	cycles	
13	Frequency	50	Hz											50,0
14		Connect to GPTR		COM2								Down Transient		
15		GPTR status			<input type="checkbox"/>	Extended User Interface								
16		GPTR Reset												
17		Sheet values = GPTR Internal values												
18														
19														
20														
21														
22														
23														
24														
25														
26														
27														
28														
29														
30														

The big button may have a red color as background, like in next figure:

In this case, the red color informs you that some values in the worksheet do not match the internal values of the GPTR. If you are visualizing these values (see [Visualizing GPTR internal values](#)) you can check this visually.



## Changing values of variables

The changes of the values of each variable is done in a two phases approach.

1. First you modify the corresponding "desired" value in the corresponding cell.
2. If the new values do not match the internal values in the GPTR then, the big button will show "Sheet values <> GPTR internal values" and its background color will turn to red, indicating that situation.
3. You press this button to *impressed* the new values in the GPTR. As a result the GPTR internal values will change and this button will change caption to "Sheet values == GPTR internal values" and the background color will turn to grey.

The changes of voltages and currents are done using "slopes" according to the actual values for the [RSx and RBx](#) parameters. See also [down transient](#). That means that the changes will not occur instantaneously, preventing undesired effects on the loads. See [how values changes occur](#).

## Changing voltages

Voltages can be change individually, modifying directly their corresponding cell. They can be changed at once using the "All together" cell, marked with a "red" triangle at the right top corner.

	Variable	Values	Units
1			
2	V1	390	V
3	V2	390	V
4	V3	390	V
5	All together	390	V

The user is not allow to set more than 420 volts nor below 0.

## Changing currents

Current can be change individually, modifying directly their corresponding cell. They can be changed at once using the "All together" cell, marked with a "red" triangle at the right top corner.

7	I1	500	A
8	I2	1000	A
9	I3	1000	A
10	All together	1000	A

The user is not allow to specify more that 1000 amps nor below 0.



### Changing voltages phases

Only phases of voltage channels 2 and 3 can be changed as channel 1 is the general phase reference.

	Variable	Values	Units	Phase angle
1				
2	V1	390	V	0
3	V2	390	V	120
4	V3	390	V	240
5	All together	390	V	

If the user tries to specify an angle out of the 0 to 360 range it will be converted to the adequate value in this range. Example : entering "370" will produce "10".

### Changing current phases

The phases of the current generators can be changed individually in their absolute values (cells in column "Phase angle") or as relative values to their voltages phases counterparts (cells in column "Relative Phase Angle"). These later ones can also be changed at once with the cells marked with a red triangle in the right top corner.

D	E
Phase angle	Relative Phase Angle
0	
120	
240	
0	0
120	0
240	0
All together	0



All values are "fixed" to the corresponding value in the 0 to 350 range.

### Short circuit of voltages or overcurrent

The GPTR generators are equipped with electronic protection devices that limits the total power on each channel to around 15 watts. Whenever this power is exceeded in any channel it enters the "tripped" state. In this application that situation is indicated by a red color cell in the value of the Grid Analyzer variables's column

A	B	C	D	E	F	G	H	I	J	K	N
Variable	Values	Units	Phase angle	Relative Phase Angle	cosFi	Active Power	Reactive Power	Ramp Up	Ramp Down	Units	Grid Analyzer reading
V1	390	V	0					120	50	V/cycle	391
V2	390	V	120					120	50	V/cycle	0
V3	390	V	240					120	50	V/cycle	393
All together	390	V									
I1	500	A	45	45	0,7071	137.886	137.886	120	50	A/cycle	508
I2	500	A	165	45	0,7071	137.886	137.886	120	50	A/cycle	506
I3	500	A	285	45	0,7071	137.886	137.886	120	50	A/cycle	509
All together	500	A	All together	45		413.657	413.657				
Frequency	50	Hz									50,0
<b>Sheet values = GPTR Internal values</b>											
Calibrate			Store parameters in GPTR			GPTR Reset					
Generators Online				Grid Analyzer Online							
Close connection			COM3	<input type="checkbox"/> Extended User							

as well as in the color of the button with caption "GPTR Reset", that turns to red.

The GPTR will continue to accept changes for the remaining channels, but the "tripped" channel will continue in this state till you issue the "Reset" command. You can do so pressing the "GPTR Reset" button at any moment.



### ***Open circuit in the current generators***

If the actual current in the current circuit of the Grid Analyzer drops below its lower working limit (typically below 5% of the end-of-scale limit, ie. 50 Amps) its reading indicate "0".

That situation may easily happen when any of these current circuits are opened, either inadvertently or as the result of commutation. This case is indicated in the Excel GPTR worksheet turning to red the corresponding cell in the "Grid Analyzer variables" column, as shown in the next figure.

N
Grid Analyzer reading
396
397
396
0
989
990

### ***Forcing the desired values in the GPTR***

The values indicated in the cells can be easily modified by the user. Changing these values are not automatically reflected in the GPTR generators' outputs, rather the user is informed (through the background color of the "Sheet values ..." button turning to red) that there are discrepancies between them. The user MUST press this button to put the cells values out in the GPTR.

### ***How values changes occur***

The changes for the six generators in the GPTR happen according to the RSx (ramp up) and RBx (ramp down) parameters. These parameters are specified in **Volts** (RS1 to RS3) / (RB1 to RB3) or **Amps** (RS4 to RS6) / (RB4 to RB6) **per cycle**.

Those changes happen during the 0 crossing for every cycle: this approach minimizes the impact of sudden changes in loads that can have reactive components.

Examples: if parameter RB1 is 10 V/cycle, the actual voltage at line 1 of the grid is 390 V, and the new (desired) voltage is 0 V, there will be a transition in during 39 (= 390/10) cycles. Assuming a frequency of 50 Hz (the period of the corresponding cycle is 20 ms), this transition will take 39 \* 20



ms = 780 ms.

If RB (RS) is high, say 1000 V/cycle, practically any change will happen in the minimum amount, ie, 1 cycle.

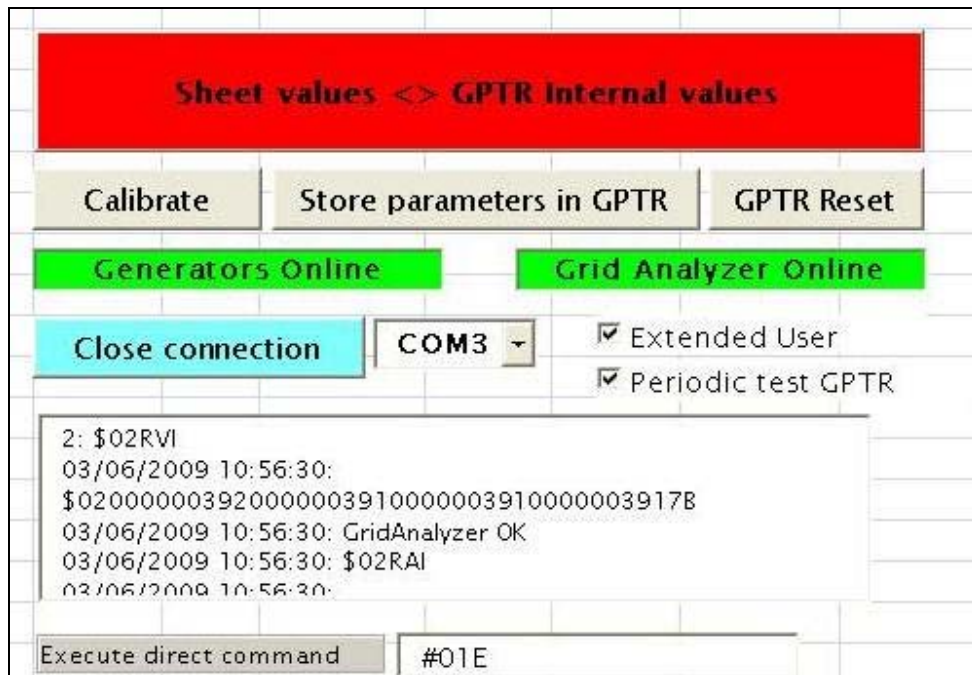
The changes for the phase values happen always with the same approach: in complete cycles, at crossing by zero. As a rule of thumb to compute the time involved in a phase change, it is 60 ms every 6°. So, for example: 30° change will take  $((30 / 6) * 60 =) 300$  ms (for 50 Hz).

All of these calculations are "per channel".

### ***Extender User Interface***

The GPTR worksheet contains a number of buttons and widgets that are typically hidden to the user, as they refer to data and operations that are not so common use.

They refer to [Calibration](#), the presentation of [internal commands tracing](#), the access to enabling the [periodic check](#) for the GPTR status and the button for [storing the actual parameters](#) inside the GPTR inside its internal the FlashEPROM. There is also a direct command textbox that can be used to issue specified commands whose response can be seen in the ["tracing" textbox](#).



Disabling the "Periodic test" is handy when developing new code. Typically this is turned on, so that every 3 seconds the code checks for the status of the Generators (ie., checks if the GPTR is plug and powered-up, or accesible, or if any of the generators have entered a trip state), and also proceeds to read the voltages, currents and frequency measurement done by the Grid Analyzer. These later values are presented in the column labeled "Grid Analyzer values" If the Generators programming interface is not reachable (pe, the RS232 cable is unplug or broken)

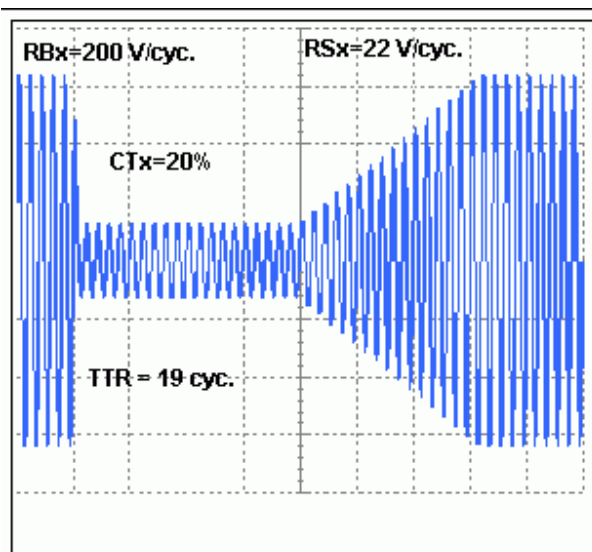


then that situation will be indicated using the "Generators" label that will turn to red background and the caption will be changed to "Generators offline". Similarly for the Grid Analyzer and its label. In the case of the Grid Analyzer being unreachable, its label will turn to red, the caption will change to "Grid Analyzer offline" and also the cells in column "Grid Analyzer values" will change its background color to yellow, indicating those values are not updated.

The "Execute direct command" textbox allows the execution of any allowed command for the GPTR and some of the Grid Analyzer's commands. The answers to these commands, and to any of the implied commands associated to the buttons above, are presented in the log textbox, together with its time-stamp. The contents of this textbox can be "copied" to the clipboard using standard Windows procedures (select and copy), so they can be taken to any document (in Word for example) for documentation purposes.

### Executing a Down transient

This functionality allows the execution of a transient similar to the next figure



according with the preset values for the ramp down (RBx), ramp up ("RSx"), valley's values ("CTx") and duration ("TTR").

This is executed through the button



If any has been changed (and therefore the "Send values" button is in red background), those changed values are sent previously to the execution of the transient.

For computation of the total time involved in the changes please read "[How values changes occur?](#)".



The minimum time for the valley (TTR), for a single channel, is 10 cycles (ie, around 200 ms for 50 Hz). Adding a second channel adds a minimum of 90 ms, a third channel adds 180 ms.

The maximum time for TTR is 3000 cycles, that correspond to 1 minute (60000 ms) for a frequency of 50 Hz.

### Changing valley time

The value of the parameter TTR parameter can be changed between 10 and 3000 cycles, that correspond, when frequency is 50 Hz, to 200 ms and 60 seconds respectively. That for a single channel. See "[How values changes occur?](#)"

### Changing valley value

The value of the generators at the value period is specified, independently for each channel, as a percent of the corresponding value at the start of the transient. Minimum value is 0.

### Calibration

The GPTR consist of 6 synchronous generators (3 for voltages and 3 for currents) that can be calibrated independently. To do so the GPTR admits a specific command ("C" command, see the User's Manual), that measure the actual generated values through the (internal) Grid Analyzer and use the actual ("desired") internal values ("VEx", "IEx") to compute the calibration parameters for each channel ("CVx" and "CIx").

NOTICE: These new parameters are lost if you do not exercise the option "[Store parameters](#)", so next time you execute a "GPTR Reset" or power down and up, the former stored parameters will be used again.

Calibrate

**IMPORTANT NOTICE:** the calibration of the generators requires measurements from the internal Grid Analyzer. This analyzer does not provide measurements if the values correspond to less than 5% of the end-of-scale values. That corresponds to 25 v for the voltage channels and 50 A for the current channels.  
So the user is informed about the need to execute calibration using the end-of-scale values and, in any case, inhibiting it if the actual values do not meet the above limitations.

### ALTERNATIVE MANUAL PROCEDURE FOR CALIBRATION

You can also do manual calibration using the commands for setting the CV1, CV2, CV3 , CI1, CI2, CI3 parameters. Those parameters can be read (see the manual)



## Tracing

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The textbox for tracing (see below) presents a trace of the commands sent to the GPTR and their corresponding responses:

```
24/05/2009 18:27:31: $02RVI
24/05/2009 18:27:31:
$0200000039600000039700000039700000039690
24/05/2009 18:27:31: $02RHI
24/05/2009 18:27:31: $025001B
```

In the example above you can see that the command "\$02RVI" get the answer "\$0200000039600000039700000039700000039690" and the command "\$02RHI" gets back "\$025001B".

## ***Periodic tracing***

This option control the execution of the periodic tests that checks that the GPTR is connected.

Periodic test GPTR Status

If not set, the values of the "Grid Analyzer" column nor the indication of the "GPTR Status" will be updated, unless you press manually the "GPTR Status" button.  
The periodic timer is set to 3 seconds.

## ***Storing parameteris in GPTR***

This button execute the "G" command of the GPTR.



After pressing this button all the parameters are stored in the internal EEPROM. These parameters will be in place whenever you press the "GPTR Reset" or at power-up.

## ***Direct command***

The direct command textbox (see below), in combination with the [tracing](#) textbox, permits the execution and visualization of the response to directly typed commands.



```

24/05/2009 18:27:31: $02RVI
24/05/2009 18:27:31:
$0200000039600000039700000039700000039690
24/05/2009 18:27:31: $02RHI
24/05/2009 18:27:31: $025001B
  
```

Execute direct command

### Visualizing GPTR internal values

For debugging purposes sometimes it is required to visualize the values of the variables and parameters in the GPTR. This can be achieved at any moment going to the cell "A1" (labeled with "Variables") and pressing right button of the mouse.

You will be prompted to introduce the [password](#), after that the following (normally hidden) set of columns will appear.

O	P	Q	R	S
<b>GPTR</b>	<b>GPTR</b>	<b>GPTR</b>	<b>GPTR</b>	<b>GPTR</b>
<b>Internal</b>	<b>Internal</b>	<b>Internal</b>	<b>Internal</b>	<b>Internal</b>
<b>Vs / Is</b>	<b>Phases</b>	<b>IRs<sub>x</sub></b>	<b>IRb<sub>x</sub></b>	<b>CTs</b>
400	0	120	50	10
400	120	120	50	10
400	240	120	50	10
500	0	120	50	10
1000	120	120	50	10
1000	240	120	50	10
				100
50				

They correspond to the actual values for the generators (column "GPTR Internal Vs/Is", frequency



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at the bottom), for the phases ("GPTR Internal Phases"), run up slopes ("GPTR Internal RSx"), run down ("GPTR Internal RBx") and the parameters



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### ***Password***

A password is used to prevent access to the internal of values of the GPTR as well as to acces the [Extended User Interface](#). This password MUST BE IN ALL CASES equal to the password used to protect the "GPTR" worksheet. This is set to "ACMACM".

If you want to change the protection password for this woksheet (**WE STRONGLY RECOMMEND TO USE THIS WORKBOOK WITH "GPTR" WORKSHEET PROTECTED**) then you also **MUST CHANGE** the value of the  
'Const PwdDefault As String = "ACMACM"  
located at the beginning of this worksheet's code accordingly.



## Code description

The code available in this workbook uses the functionalities of a specific DLL, named "ACM\_GPTR\_v1.DLL" as interface with the actual chain of connection:  
(COM port) <-> (RS232-to-RS485 converter) <-> (GPTR)

The instance of "ACM\_GPTR\_v1.DLL" implements a "proxy" of the actual device (GPTR) and holds, when properly connected, a copy of its internal variables.

The "ACM\_GPTR\_v1.DLL" must be properly registered, using the standard command "regsvr32 ACM\_GPTR\_v1.DLL". For this operation you must have administrative permissions in the PC.

The code relies in a number of ranges of cells, that must exist. The listing is included [here](#).

## Defined ranges in the worksheet

The code use a number of ranges of cells that must exist and correspond to adequate sets of cells.

Range name	Associated to cells
vAccess	A1
vVE1	B2
vVE2	B3
vVE3	B4
vIE1	B7
vIE2	B8
vIE3	B9
vFV2	D3
vFV3	D4
vFI1	D7
vFI2	D8
vFI3	D9
vFRQ	B13
vRFI1	E7
vRFI2	E8
vRFI3	E9
vRS1	I2
vRS2	I3
vRS3	I4