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TECHNICAL MANUAL

BHK-MG 40 WATT (1/2 RACK)
BHK-MG 200 WATT (FULL RACK)
VISA INSTRUMENT DRIVER

KEPCO INC.
An ISO 9001 Company.

MODEL

BHK-MG
VISA INSTRUMENT DRIVER

ORDER NO.	REV. NO

IMPORTANT NOTES:

1) This manual is valid for the following Model and associated serial numbers:

MODEL	SERIAL NO.	REV. NO.

2) A Change Page may be included at the end of the manual. All applicable changes and revision number changes are documented with reference to the equipment serial numbers. Before using this Instruction Manual, check your equipment serial number to identify your model. If in doubt, contact your nearest Kepco Representative, or the Kepco Documentation Office in New York, (718) 461-7000, requesting the correct revision for your particular model and serial number.

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KEPCO, INC. ● 131-38 SANFORD AVENUE ● FLUSHING, NY. 11352 U.S.A. ● TEL (718) 461-7000 ● FAX (718) 767-1102
email: hq@kepcopower.com ● World Wide Web: http://www.kepcopower.com

BHK-MG 200 WATT (FULL RACK) AND 40 WATT (1/2 RACK) VISA INSTRUMENT DRIVER

The VISA instrument driver supplied with the BHK-MG 200 Watt (Full Rack) and 40 Watt (1/2 Rack) Power Supply is provided to simplify programming with a VISA compatible GPIB controller. The latest driver can be downloaded from the Kepco website (http://www.kepcopower.com/drivers.htm). The driver includes the source code (C) for all VISA functions (kp_BHK.c).

Since the software drivers supplied by Kepco are VISA compliant, they require the installation of the proper VISA driver from your GPIB card supplier. The Kepco website (http://www.kepcopower.com/drivers.htm) provides links to various vendor sites for these drivers.

1. VISA INSTRUMENT DRIVER FUNCTIONS

Kepco's BHK-MG VISA instrument driver provides programming support for Kepco's BHK-MG 40 Watt (1/2 Rack) Series Power Supplies (VISA I/O). It contains functions for opening, configuring, taking measurements from, test, calibration and closing the instrument. To successfully use this module, the instrument must be connected to the GPIB and the GPIB address supplied to the initialize function must match the GPIB address of the instrument.

Table 1 lists the functions that are available.

TABLE 1. BHK-MG VISA DRIVER FUNCTIONS

Purpose	Function Name	Description
INITIALIZE FUNCTION		
Initialize	KpBhk_init	Initializes the instrument and sets it to a default configuration.
APPLICATION FUNCTIONS — This class of functions contains high-level test and measurement routines. These functions call other instrument driver functions to configure, start, and get readings from the instrument.		
Set and Measure	KpBhk_ApplicSetMeas	Used to either set and read back, or just read back the output voltage, current and operating mode of the power supply
Get/Set Memory Value	KpBhk_GetSetListValue	This function can either get or set the values stored in any one of the 40 available memory locations. Six parameter values can be stored in any one of the 40 locations: voltage level, current level, overvoltage level, overcurrent level, duration of the setting (if used in a program) and next memory address (if used in a program). Depending on the slide selection position, and the value of get/set switch, one of these values is read or set. The values are checked against the maximum acceptable values for the corresponding power supply.
CONFIGURATION FUNCTIONS — This class of functions configures the instrument by setting system configuration parameters.		
Get Current Range	KpBhk_getCurrRange	FULL RACK units only. Gets the current range: 1 = High range, 0 = Low range
Set Current Range	KpBhk_setCurrRange	FULL RACK units only. Sets the current range: 1 = High range, 0 = Low range
Set Maximum Limit Value	KpBhk_SetMaxLimValue	Sets the temporary voltage limit or current limit of the power supply. The limit reduces the output range of the power supply. For example, the output voltage range of a 0 to 10V power supply can be limited to the range of 0 to 5.25V by setting the voltage limit to 5.25V.
Get Maximum Limit Value	KpBhk_GetMaxLimValue	Gets the maximum limit value of the power supply.
Get Minimum or Maximum Value	KpBhk_GetMinMaxValue	Gets the minimum or the maximum output voltage, output current, overvoltage level, or overcurrent level of the power supply depending on the min_max switch and slide selection position.

TABLE 1. BHK-MG VISA DRIVER FUNCTIONS (CONTINUED)

Purpose	Function Name	Description
Set Trigger Voltage and Current	KpBhk_SetTrig_Volt_Curr	Sets the trigger voltage and trigger current at the same time
Set Trigger Value	KpBhk_SetTrigValue	Sets the trigger voltage or trigger current level, depending on the switch position.
Get Trigger Value	KpBhk_GetTrigValue	Gets the trigger voltage or the trigger current level, depending on the switch position.
Set Overvoltage and Overcurrent	KpBhk_Set_OVvolt_OVcurr	Sets both the overvoltage and overcurrent values.
Set Protection Delay	KpBhk_setProtDelay	Sets the protection delay: the delay between the moment the output voltage and current are changed and the moment the overvoltage and overcurrent protections are enabled.
Get Protection Delay	KpBhk_getProtDelay	Displays the protection delay count for the power supply. A count of 30 represent ~ 1 second. The protection delay is the delay between the moment the output voltage and current are changed and the moment the overvoltage and overcurrent protections are enabled.
ACTION/STATUS FUNCTIONS — This class of functions executes commands and queries. It also provides functions which allow the user to determine the current status of the instrument.		
Set Voltage and Current	KpBhk_Set_Volt_Curr	Sets the output voltage and current at the same time.
Set Value	KpBhk_SetValue	Sets the output voltage, the output current, the overvoltage level, or the overcurrent level of the power supply, depending on the slide selection position. The values are checked against the maximum acceptable values for the corresponding power supply.
Get Value	KpBhk_GetValue	Gets the output voltage, the output current, the overvoltage level, or the overcurrent level of the power supply depending on slide selection position.
Trigger	KpBhk_Trig	Triggers the instrument once. The output will go to the trigger voltage and current values.
Measure Output Value	KpBhk_MeasValue	Measures the value of output voltage or current depending on the switch position.
Get Source Mode	KpBhk_GetSourceMode	Gets the operating mode of the power supply.
Output On/Off	KpBhk_OutputOnOff	Sets the output on or off.
Get Output Status	KpBhk_getOutputState	Returns the output status (on or off).
Get Current Range	KpBhk_getCurrRange	Gets the operating current range of the power supply.
Set Current Range	KpBhk_setCurrRange	Sets the operating current range of the power supply
Abort Measurement	KpBhk_abortMeas	Sends the abort command.
Beep	KpBhk_beep	The selected BHK-MG power supply will emit a beep.
DATA FUNCTIONS — This class of functions transfers data to or from the instrument.		
Questionable Data	KpBhk_StatQues	Tests for questionable data, then gets the condition.
Run/Stop LIST Program	KpBhk_Prog	Sends a RUN or STOP LIST program command.
Get Status of LIST Program	KpBhk_Prog_Stat	Gets status of program: 0 = stopped, 1 = running
Send Direction of LIST Program	KpBhk_Prog_Dir	Sends direction to run LIST program (UP or DOWN). Does NOT apply to 40-step LIST programs available from front panel.
Send Loop Count of LIST Program	KpBhk_Prog_Count	Sends loop count value - how many times the LIST program will run. Value of 0 = run continuous. Does NOT apply to 40-step LIST programs available from front panel.

TABLE 1. BHK-MG VISA DRIVER FUNCTIONS (CONTINUED)

Purpose	Function Name	Description
Send Loop Count Skip Value of LIST Program	KpBhk_Prog_Count_Skip	Sends skip value used after first pass through LIST program. Represents loop-back point from which program will be repeated after the first pass through.
Save/Recall Settings	KpBhk_SaveRecSet	Saves the current settings to the selected memory location or restores previously stored settings from a memory location. The memory location range is from 1 to 40.
UTILITY FUNCTIONS — This class of functions provides lower level functions to communicate with the instrument and to change instrument parameters.		
Identify Power Supply	KpBhk_identify	Returns the full message returned by the power supply to the *IDN? query. This message contains four fields: manufacturer, power supply type, serial number and firmware version.
Revision Query	KpBhk_RevisionQuery	Returns the revision numbers of the instrument driver and instrument firmware version from the *idn? query. This instrument driver's Revision Number is "Rev 1.0, 9/95, CVI 3.1" and the BHK-MG firmware version is Firmware Version "1.0". This data is necessary when requesting technical support.
Model Query	KpBhk_ModelQuery	Return the model number of the BHK-MG power supply.
Serial Number Query	KpBhk_SerialnQuery	Returns the serial number of the BHK-MG power supply. The serial number is extracted from the answer to the *idn? query.
Query SCPI Version	KpBhk_GetScpiVersion	Returns the power supply answer to the Query SCPI Version command. Checks the Standard Commands for Programmable Instruments (SCPI) language version.
Set/Reset Keypad Lock	KpBhk_setResetKeybLock	Locks or unlocks keypad operation. Used to prevent changing the settings of the power supply from the local keypad.
Keypad Lock Status	KpBhk_keybLockStat	Return the status of the local keypad access: 0 if local access enabled; 1 if local access is disabled.
Display Text	KpBhk_display	Configures the front panel display of the instrument. In normal mode the values measured at the output of the power supply are displayed. In text mode a user defined string can be displayed on the second row of the display.
Get Display Text	KpBhk_getDisplay	Gets the string which is displayed on the second line of the display.
Get Display Contrast	KpBhk_getContrast	Gets the contrast value of the front panel display of the instrument (between 0.1 and 0.9).
Set Display Contrast	KpBhk_setContrast	Configures the contrast of front panel display of the instrument (value between 0.1 and 0.9).
Write To Instrument	KpBhk_writeInstrData	This function writes commands and queries to the instrument to modify parameters and query device settings.
Read Instrument Data	KpBhk_readInstrData	This function reads data from the instrument's output buffer and returns it to the specified variable in memory. Because the instrument may return both numeric and text data in response to queries, this function returns the data in string format. NOTE: If valid data is not available at the instrument's output buffer when this function is called, the instrument will hang up and the function will not return until it times out. If the time-out is disabled,` this function will hang indefinitely and it may be necessary to reboot the computer to break out.
Reset	KpBhk_psReset	Resets the instrument to a known state and sends initialization commands to the instrument.
Self-Test	KpBhk_selfTest	Runs the instrument's self test routine and returns the test result(s).
Error-Query	KpBhk_errorQuery	Reads an error code from the instrument's error queue.
Error Message	KpBhk_errorMessage	Takes the Status Code returned by the instrument driver functions, interprets it and returns it as a user readable string.

TABLE 1. BHK-MG VISA DRIVER FUNCTIONS (CONTINUED)

Purpose	Function Name	Description
Calibration Status On/Off	KpBhk_CalStatus	Used to enter or exit the calibration state. To enter the calibration state a 4 digits password is required. When the instrument is shipped from the factory the calibration password is the 4 digit model number. The password protects the instrument against unauthorized calibrations.
Calibration Mode	KpBhk_CalMode	Allows the user to select the calibration mode (either voltage or current calibration) and also allows selection of 0 (min) or full scale (max) calibration.
Calibration DigPot	KpBhk_CalDigPot	Allows a more accurate full scale calibration in both voltage or current mode. Moving the digital potentiometer allows the user to approach the nominal full scale value of the corresponding power supply. This is a coarse adjustment for the full scale value which must be followed by a fine adjustment done with the Calibration Output function.
Calibration Output	KpBhk_CalOutput	Allows the user to perform the power supply calibration in both voltage or current mode. By moving the digital to analog converter the number of LSB's specified in the repeat count, the user can approach the 0 or full scale value of the corresponding power supply. This is a fine adjustment for the 0 or full scale value. The user can specify a repeat count between 1 and 9 in order to avoid having to repeat sending the command
Calibration Zero	KpBhk_CalZero	Used to zero the output of the power supply before switching from voltage calibration to current calibration (to allow a calibration resistor to be connected between the power supply output terminals.
Calibration Save	KpBhk_CalSave	Stores the calibration results in the nonvolatile calibration memory of the instrument. Calibration date must be passed using the format: MM-DD-YYYY (MM = month, DD = day, YYYY = year)
Security Code	KpBhk_CalCode	Allows the user to change the password to prevent accidental or unauthorized calibrations of the instrument. The password is stored in nonvolatile memory, and does not change when power has been off or after a reset. To change the password, the instrument must already be in calibration status, ensuring that the user knows the current password. If the password is lost, call the factory for support.
Close	KpBhk_close	This function takes the instrument off-line.

TABLE 2. FACTORY DEFAULT CALIBRATION PASSWORDS

MODEL		PASSWORD
BHK 300-0.6MG	BHK 300-130MG	0300
BHK 500-0.4MG	BHK 500-80MG	0500
BHK 1000-0.2MG	BHK 1000-40MG	1000
BHK 2000-0.1MG	BHK 2000-20MG	2000

2. DEMONSTRATION PROGRAM USING THE VISA DRIVER

The demonstration program is intended to illustrate the use of the VISA functions included with the BHK-MG power supply. The demonstration program is installed under Windows by running SETUP.EXE. The program as written presents a virtual front panel for control of a single BHK-MG Power Supply.

The following paragraphs describe the windows and the associated controls and indicators provided with the demonstration program. For additional details regarding operation of the BHK-MG, refer to the operating instructions for local and remote mode found in the associated Technical Manual for the BHK-MG 40 Watt (1/2 Rack) or 200 Watt (Full Rack) Series.

2.1 GPIB SETUP

After the program is installed, double click on BHK-CTRL.exe to run the program.When the GPIB Setup window opens, enter the GPIB address of the BHK power supply to connect to the VISA interface. If the power supply type is correct, the Continue button will open the Main Panel (Figure 2).



FIGURE 1. GPIB SETUP WINDOW

. Once you are connected, you will see the Main Panel (Figure 2 for 1/2 Rack, Figure 3 for Full Rack).

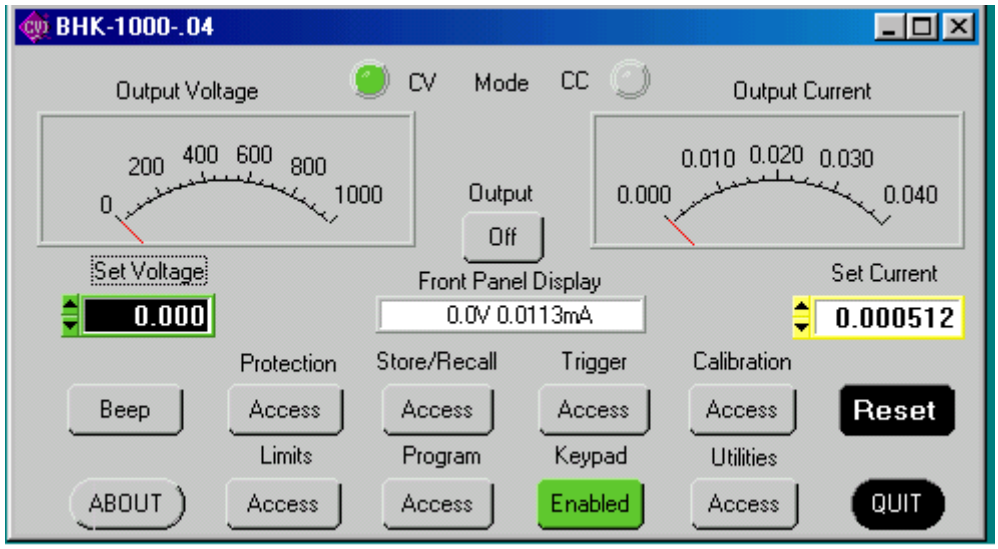


FIGURE 2. MAIN PANEL WINDOW (!/2 RACK)

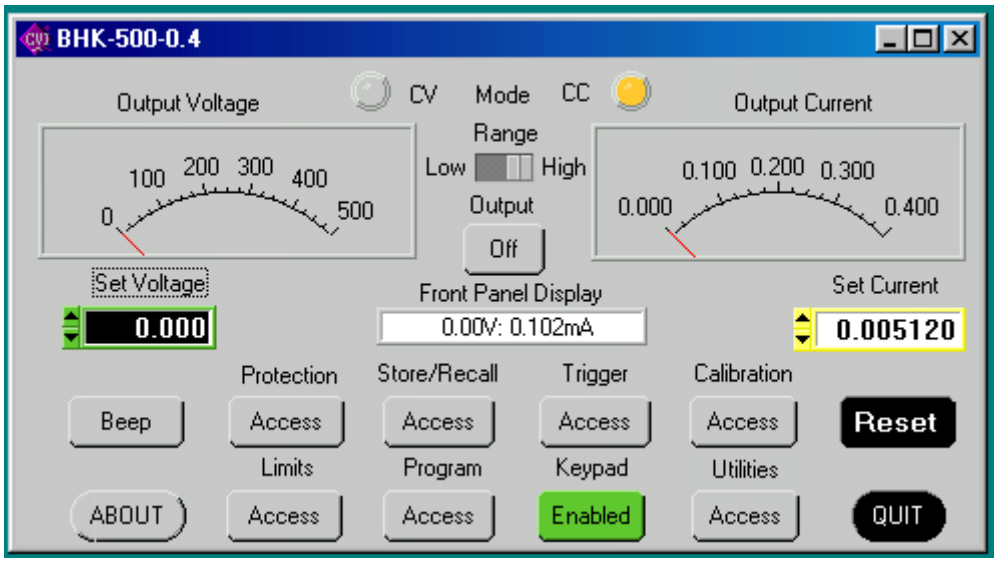


FIGURE 3. MAIN PANEL WINDOW (FULL RACK)

2.2 MAIN PANEL

The main panel window allows access to all power supply parameters without having to execute local controls and read the corresponding display. The main panel is a real-time display of output values and programmed parameters. All functions are available from the main panel.

The operating mode (CV or CC); Mode indicators light to indicate whether the power supply is operating in either CV (constant voltage) or CC (constant current) mode.

The analog meters read actual output voltage and current; Two windows beneath the meters are provided to enter voltage and current setpoints.

2.2.1 (FULL RACK ONLY) The **Range** switch selects the current range, either High or Low.

2.2.2 The **Output** button applies the programmed settings to the output terminals when set to ON or keeps the output voltage at zero and current at minimum when set to OFF.

2.2.3 **Set Voltage** and **Set Current** windows are used to program the output voltage and current for the unit; settings can be changed either by clicking on the arrows to the left of the display window, or by using the mouse to highlight the setting, then typing in the new value.

2.2.4 The **Protection** button opens the Protection Window (Figure 4) which allows changing of the overvoltage and overcurrent settings.



FIGURE 4. PROTECTION WINDOW

2.2.5 The **Store/Recall** button displays the Store/Recall window (Figure 5which can be used to store or recall up to 40 different power supply settings. After selecting a location, the Store button saves the follow-

ing power supply settings. Voltage Setpoint, Current Setpoint, and Output On/Off status. Whenever the same location is selected, the Recall button restores the saved settings.



FIGURE 5. STORE/RECALL WINDOW

2.2.6 The **Trigger** button opens the Trigger window (Figure 6) which allows setting of trigger voltage and current values. Clicking the Trigger button within the Trigger window causes the power supply output to be programmed to the settings stored in the Trigger Voltage and Trigger Current displays. .



FIGURE 6. TRIGGER WINDOW

2.2.7 The **Calibrate** button The **Calibrate** button opens the Calibration Window (Figure 7), and is used to recalibrate the unit (see Section 4 of the BHK Technical Manual).

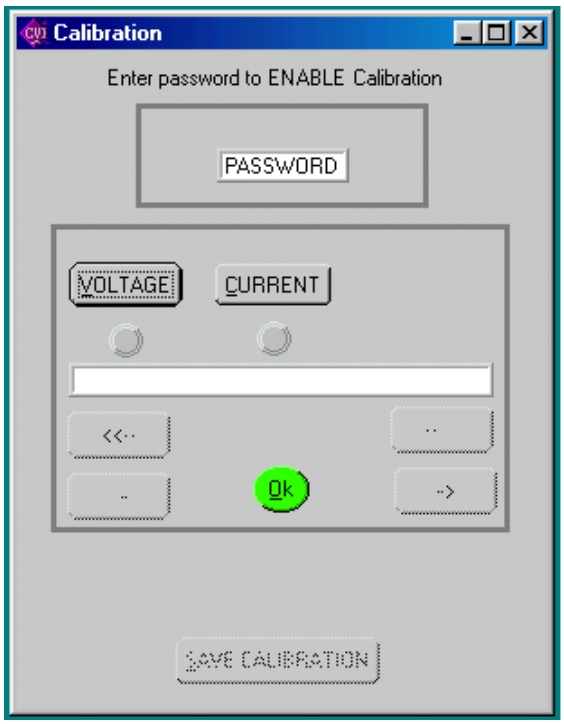


FIGURE 7. CALIBRATION WINDOW (HALF RACK)

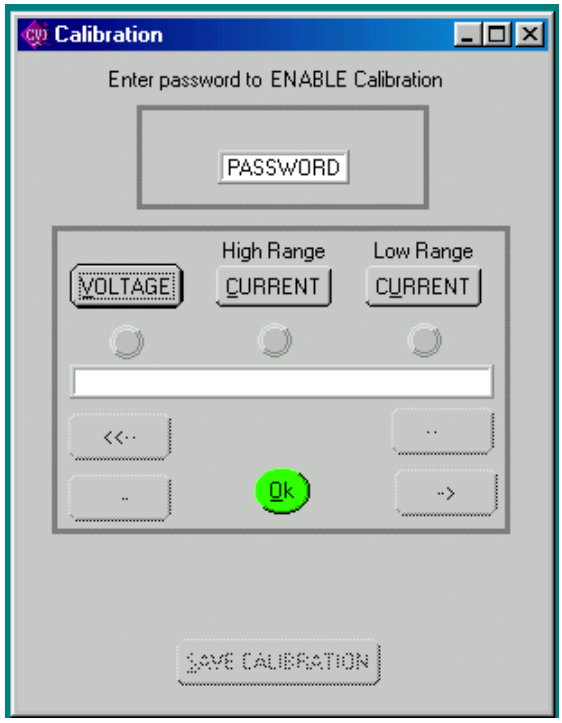


FIGURE 8. CALIBRATION WINDOW (FULL RACK)

2.2.8 The **ABOUT** button displays the model, serial number, calibration date, firmware version number and driver version number. Click OK to close the window

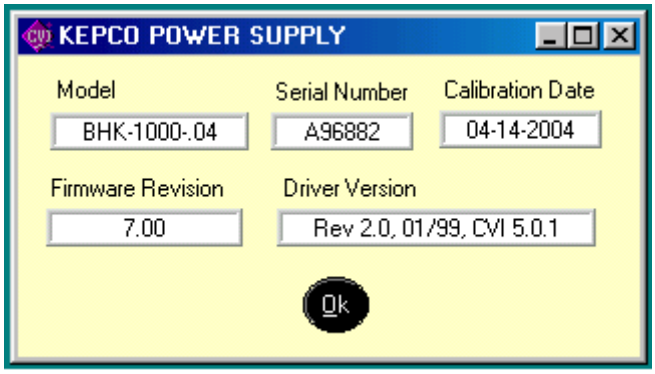


FIGURE 9. ABOUT WINDOW

2.2.9 The **Limits** button opens the Limits window (Figure 10).



FIGURE 10. LIMITS WINDOW

2.2.10 Running or generating a program (pattern) is accomplished by clicking the **Program** button on the Main Panel, opening the Program Lists window (Figure 11). Programs can either be defined point-by-point using the **Pattern Generator Open** button, or by using the **Pattern Import File Select** button to import a file containing the program parameters.

2.2.10.1 The **Pattern Generator Open** button opens the Pattern Generation Window (Figure 13); the **Pattern Execution Open** button opens the Pattern Execution window (Figure 14).

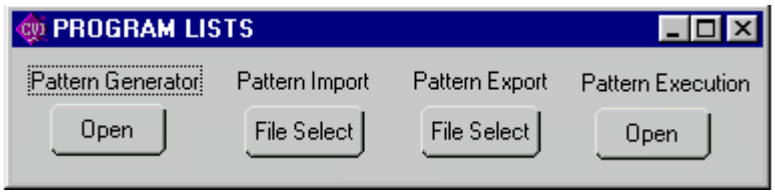


FIGURE 11. PROGRAM LISTS WINDOW

2.2.10.2 Patterns can be imported in comma-delineated text format using the **Pattern Import File Select** button (Figure 11). The format, showing a single data point, is illustrated in Figure 12 and defined as follows:

2.2.10.3 The first line is a header, that defines columns (separated by commas) with a corresponding parameter. The column with a “C” or “c” is defined as Current, “V” or “v” is defined as voltage, “D” or “d” is defined as Dwell Time followed by (CR,LF). The second line defines the first data point, with data separated by commas (in the same order as defined by the header), followed by (CR,LF). Additional data lines

define additional data points. The EOF defines the end of the pattern. A pattern produced using the Pattern Generation window (Figure 13) can be saved in this format using the **Pattern Export File Select** button.

```
Current,Voltage,Dwell(cr,lf)
1.0123E+02,3.600E+02,1.0E-02(cr,lf)
(eof)
```

FIGURE 12. FORMAT FOR TYPICAL COMMA-DELINEATED PATTERN GENERATION FILE

2.2.10.4 The Pattern Generation window (Figure 13) allows a user-specified program of up to 250 points to be generated. This method of generating complex patterns, allows rigorous testing of a UUT (Unit Under Test), within the boundaries determined by the power supply and the load conditions.

2.2.10.5 The **GENERATED POINTS** window shows the number of points currently included in the list for each of the three parameters, CURRENT, VOLTAGE and DWELL. The **CLEAR LISTS** button clears all points in the list (individual points can be edited, but not deleted once they have been added).

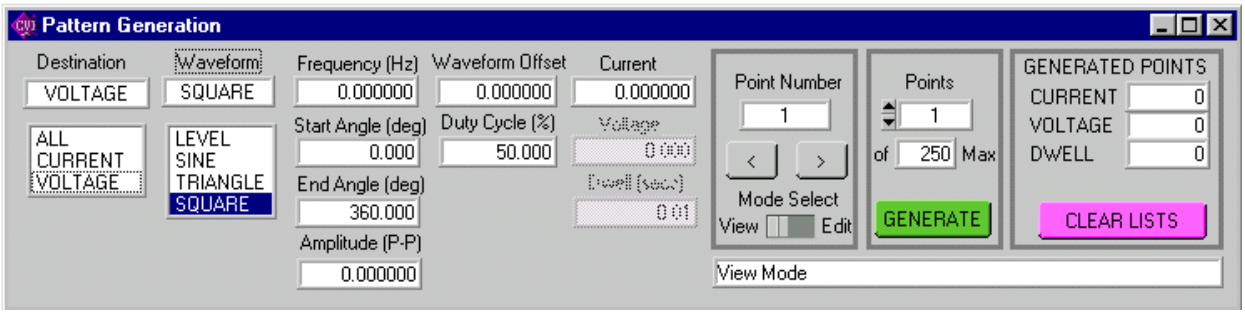


FIGURE 13 PATTERN GENERATION WINDOW

2.2.10.6 There are three choices for **DESTINATION**: ALL, CURRENT or VOLTAGE.

- Destination of **ALL** means that all three parameters, CURRENT, VOLTAGE and DWELL must be entered for each point. CURRENT and VOLTAGE must be within the operating range of the Model settings in effect, otherwise they must be within the rated maximum values of the power supply. DWELL, the amount of time that the programmed parameters will be in effect, can be set to any value from 0.01 to 655.36 seconds.

- Destination of **CURRENT** or **VOLTAGE** means that a waveform must be selected. The three waveform choices are SINE, TRIANGLE and SQUARE. Waveforms may consist of a single segment, or multiple segments, each defined separately (see PAR. 2.2.10.9 for details).

NOTE: The values chosen for Amplitude and Waveform Offset must be within the limits established by the Protection and Model settings windows.

2.2.10.7 With the **MODE SELECT** switch set to VIEW, the parameters for each point can be viewed, but not changed. The values displayed apply to the point indicated in the **Point Number** window. Use the **<** and **>** buttons to navigate through the list or enter a number directly in the **Point Number** window and press ENTER on the computer keyboard to get to a specific point. By changing the **MODE SELECT** switch to **EDIT**, values for existing points can be changed by entering a new value for any of the parameters.

2.2.10.8 As an example, if a five point list was to be entered, where all the values were the same except the voltage, the list could be initially generated by specifying 5 points (which will all be identical), then setting the **MODE SELECT** switch to EDIT and using the **<** and **>** buttons to view and edit the voltage for each point

2.2.10.9 **Complex Pattern Generation.** When the **Destination** is set to CURRENT or VOLTAGE, the pattern generator window (Figure 13) can be used to produce a complex waveform. The complex output is built by adding segments from each of the four basic waveform types: LEVEL, SINE, TRIANGLE or SQUARE. Each time the GENERATE button is clicked, the waveform selected is generated using the number of points specified in the **Points Window**. Setting **Destination** set to CURRENT produces a current waveform; a **Destination** of VOLTAGE produces a voltage waveform.

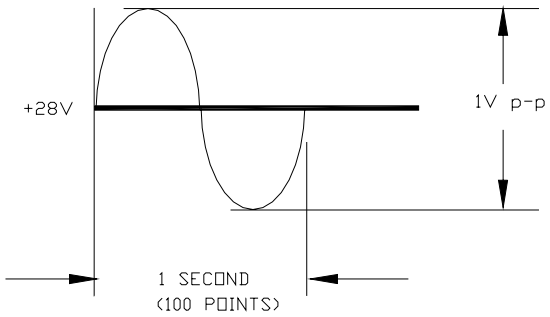
2.2.10.9.1 The SINE, TRIANGLE and SQUARE waveform types are defined by the following parameters):

- Frequency (Hz) - Determines the dwell time of the waveform segment by 1/F (Hz) = Time (sec).
- Start Angle (deg) - Integer from 0 to 360 - The starting point for the waveform segment (e.g., to start a sine wave at max positive excursion, the start angle = 90, to start at max negative excursion, start angle = 270).
- End Angle (deg) - Integer from 0 to 360 - The ending point of the waveform segment. E.g., for a negative half cycle of a sine wave, the start angle = 180, end angle = 360.
- Amplitude (p-p) - The peak to peak amplitude of the *complete* waveform segment. E.g., if you want a positive sine wave half cycle (start angle = 0, end angle = 180) from 0 to 15V, the p-p amplitude for that segment must be set to 30V.
- Waveform offset - The d-c level on which the waveform rides. If the negative excursion of the waveform is used, the waveform offset must be sufficient to prevent the output from going below zero, otherwise an error will result when Program RUN is attempted. E.g., if you want a full 15V p-p sine wave cycle (start angle = 0, end angle = 360) from 10 to 25V, the p-p amplitude =15, and the offset must be set to 17.5V (if the offset = 0 an error is produced when Program RUN is attempted because the negative half cycle would require a negative voltage.
- Current (If VOLTAGE destination) or Voltage (if CURRENT destination) - establishes the output current for a voltage waveform, or the output voltage for a current waveform.

2.2.10.9.2 When the segment parameters have been entered, pressing the **GENERATE** button adds the number of points specified in the **Points** window to the list. Note that, particularly in the case of the SINE and TRIANGLE waveforms, the accuracy of the waveshape is affected by the number of points, e.g., a triangle wave produced using 100 points will be close to a true triangle wave, while one produced using 5 points will resemble stair-steps.

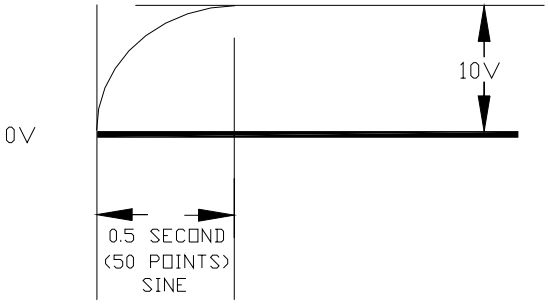
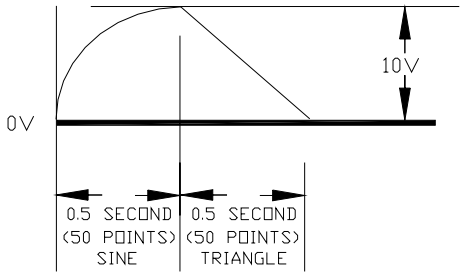
2.2.10.9.3 **Pattern Generation, Example 1.** To generate a single cycle of a voltage sine wave comprised of one cycle with an amplitude of 1 volt peak to peak riding on a 28 volt level, a fixed current of 1 mA, and a total duration of 1 second, enter the parameters listed in Table 3.

TABLE 3. PATTERN GENERATION, EXAMPLE 1

PARAMETER	ENTER	RESULT
Destination	VOLTAGE	Press GENERATE button after all parameters entered to add 100 points to list which will produce the following output: 
Waveform	SINE	
Frequency (Hz)	1.000	
Start Angle	0.000	
End Angle	360.000	
Amplitude (p-p)	1.000	
Waveform Offset	28.000	
Current	0.001000	
Points	100	

2.2.10.9.4 **Pattern Generation, Example 2.** To generate a 100 point voltage complex waveform comprised of 1/4 cycle sine wave and 1/4 cycle triangle wave with an amplitude of 10 volt peak to peak riding on 0 volt level, a fixed current of 1 mA, and a total duration of 1 second, enter the parameters listed in Table 4.

TABLE 4. PATTERN GENERATION. EXAMPLE 2

STEP	PARAMETER	ENTER	RESULT
1	Destination	VOLTAGE	Press GENERATE button after all parameters entered to add first 50 points to the list:  3042673-2
	Waveform	SINE	
	Frequency (Hz)	2.000	
	Start Angle	0.000	
	End Angle	90.000	
	Amplitude (p-p)	20.000	
	Waveform Offset	0.000	
	Current	0.001000	
	Points	50	
2	Destination	VOLTAGE	Press GENERATE button after all parameters entered to add second 50 points to list which will produce the following output:  3042673-3
	Waveform	TRIANGLE	
	Frequency (Hz)	2.000	
	Start Angle	90.000	
	End Angle	180.000	
	Amplitude (p-p)	20.000	
	Waveform Offset	0.000	
	Current	0.001000	
	Points	50	

2.2.10.9.5 By using combinations of the four basic waveform types, complex waveforms can be generated, and repeated using the Pattern Execution window (see PAR. 2.2.11) to provide great flexibility in determining the output.

2.2.11 The Pattern Execution window (Figure 14) allows the program established by the pattern generation window to be executed. If the **Loop Direction** is set to UP, the **Loop From** window establishes the point in the loop that will start repeating. For example, if the list is 10 points, and **Loop From** is set to 3, the first 2 points would only be executed once, and the points from 3 to 10 would be repeated the number of times specified in the Loop Count Window. If **Loop Count** is set to 0 the program will run continuously until stopped by the user. The **RUN** button starts the program. While the program is running the **Running** indicator is on and the **RUN** button changes to a **STOP** button used to halt the program. When the program is halted, the unit reverts to the settings in effect prior to issuing the RUN command.

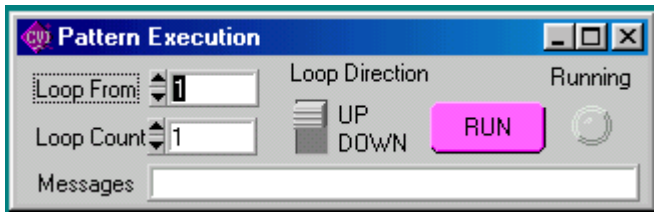


FIGURE 14. PATTERN EXECUTION WINDOW

2.2.12 The **Front Panel** button allows the front panel keyboard to be locked during remote operation.

2.2.13 The **Utilities** button opens the Utilities window (Figure 15). The Calibration Data **Dump** button allows calibration data in hex format to be sent to the host computer via the GPIB. If the correct password is entered, the calibration Data **Restore** button allows the unit to accept previously dumped calibration data and replace the Factory, Working, or Prior calibration.

2.2.14 The **Hardware Test** button tests the validity of system parameters (e.g., CRC).

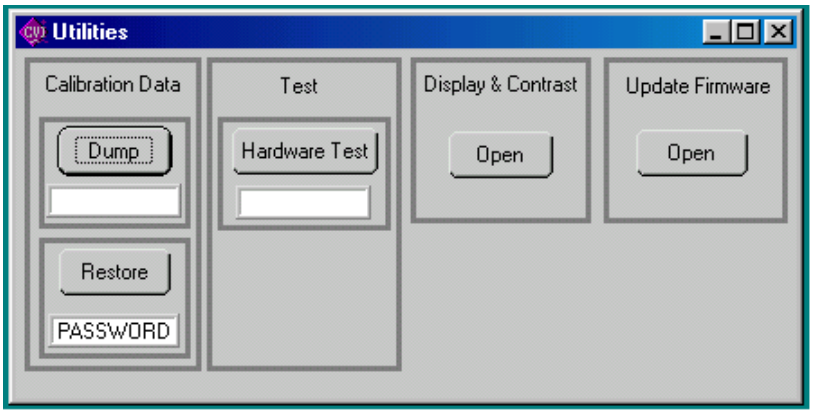


FIGURE 15. UTILITIES WINDOW

The Display **Open** button opens the Display Change window (Figure 16) which permits adjustment of contrast display.

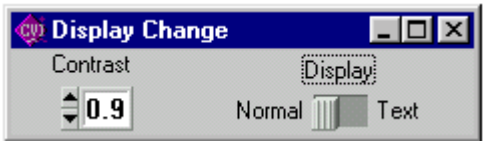


FIGURE 16. DISPLAY CHANGE WINDOW

2.2.15 The Update Firmware **Open** button opens the Update Firmware window (Figure 17) which allows the unit's firmware to be updated with updated information supplied by Kepco.

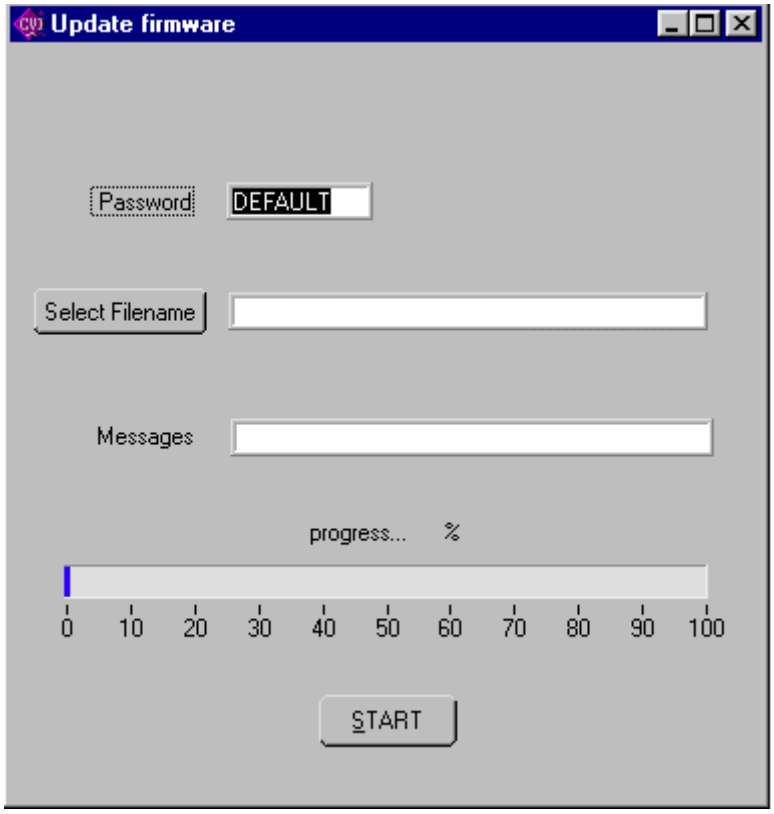


FIGURE 17. UPDATE FIRMWARE WINDOW

2.2.16 The **Reset** button resets the unit to the power up defaults: output voltage and current set to zero, and output off.

2.2.17 The **QUIT** button on the virtual panel (Figure 2) is used to exit the sample VISA application.

2.2.18 Once the program is started, actual values of output current and voltage are displayed. If you exit the program while the power supply is still on, the programmed settings in effect at that time are maintained after exiting the program.

Errors will cause the Power Supply Event Window (Figure 18) to open which allows the user an opportunity to correct the error condition and continue or quit the VISA application.

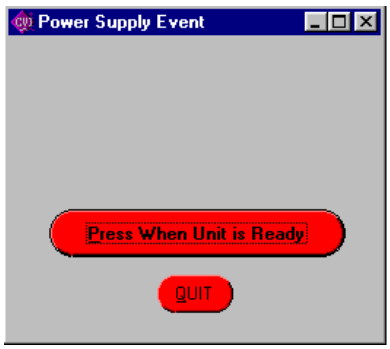


FIGURE 18. POWER SUPPLY EVENT WINDOW

3. PROGRAMMING EXAMPLES.

The following examples show the functions needed to set voltage to 15V, current to 2 Ma and output ON.

3.1 EXAMPLE 1:

```
ViByte ps_type;
ViSession BHK_Session;

Kpbhk_init ("GPIB0::6", 1, &ps_type, &BHK_Session);   //init ps
Kpbhk_Set_Volt_Curr (BHK_Session, 15, 0.002);         //voltage and current
Kpbhk_OutputOnOff ( BHK_Session, 1);                  //output on
```

3.2 EXAMPLE 2:

```
ViByte ps_type;
ViSession BHK_Session;

Kpbhk_init ("GPIB0::6", 1, &ps_type, &BHK_Session);   //init ps
Kpbhk_SetValue (BHK_Session, 0, 15);                  //voltage
Kpbhk_SetValue (BHK_Session, 1, 0.002);               //current
Kpbhk_OutputOnOff ( BHK_Session, 1);                  //output on
```

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