What’s This Scripting Language All About

Advanced Power Control - Scripting

On its own, a power switch isn’t very smart. Add custom functionality using the built-in simple BASIC scripting language. It’s really simple. No programming experience is required. Have a look at the sample scripts.

Hardware Requirements

User-defined program scripts are stored in non-volatile EEPROM.

Entering Scripts

First, review the commands and samples below for a quick overview of the BASIC script language. Log in as admin and use the Scripting link to access the programming page. After entering a command on each line, press EDIT, or just return and the command will be copied. If there’s a syntax error in the command, the screen will refresh without changes. After you’ve entered a script, check the “Enable Scripting” checkbox. Once enabled, start the script using the RUN button or any other method below.

Supported Commands

You may enter up to 127 of the commands below. Commands are executed in sequence with a “step delay” between each command. The step delay can be as short as 1 second (one command per second) or slower if you desire. Enter BASIC commands from the list below one at a time in the Script Listing section on the page http://Your_IP/script.htm. Press “Edit” after entering each command.

Multiple Threads

For advanced users: A thread is a process. You can run a multiple programs, or the same program up to 63 times simultaneously. Multiple programs may be run by multiple threads. Code space is shared. Up to 63 threads may run concurrently. Be careful when starting threads, it’s easy to start multiple simultaneous threads unintentionally.

Starting Scripts

There are several ways to start scripts:

- **On power up:** This feature automatically starts a script at Line 1 when scripting is enabled and power is first applied or when power is restored. Bad code? No worries. Pressing the “reset to defaults” button will disable scripting. Leave “END” in line 1 of the script page if you don’t plan to use power-up execution. Start your script at LINE 2 or later if you don’t want it to run automatically on power-up.

- **By another thread - RUN NNN:** One thread can create another by using the RUN NNN command. For example,10 RUN 50 creates a new thread at the line 50. The execution of the parent thread continues at line 11.

- **By Entering a URL:** To run a script via a URL, first log in and authenticate. Next, the URL: http://Your_IP/script?runNNN=run to start execution at line NNN. For example, http://192.168.0.100/script?run100=run starts script execution at line 100. Please log in first, or you’ll be redirected to the login page.

- **Using cURL or a similar function:** You can authenticate and start a script using cURL tool. There are library and command line versions of this tool. For example, cURL http://admin:1234@192.168.0.100/script?run100=run starts a script on line 100 at the default IP after authenticating admin with password 1234.

- **Via programmable web links:** To make things convenient for end users, the programmable web links on the left side of the page can can be assigned a target of the form “script?run002”   You can use this feature to create a desktop shortcut icon to start your script.

- **By manually clicking the Run button:** Once scripting is enabled, you can click the “RUN” button to the right of any line in the script.

- **Via AutoPing:** The AutoPing system can be configured to automatically start execution when IP connectivity is lost. Enter the line number to execute in the Scripting box to the right of the corresponding IP on the AutoPing page.

Enabling/Disabling Scripting

You must disable scripting (uncheck the enable box) to stop all threads before editing scripts. You must enable scripting before any script will start. Pressing the hardware reset-to-defaults switch resets to the default login and disables scripting.   Instead of clicking “EDIT” after entering each command, you can just press enter.

Stopping a Script

A script terminates automatically when the END command is reached. Click STOP ALL THREADS to stop everything manually. You can also stop all scripts via http using http://Your_IP/script.cgi?stop

Relay Debounce Warning

Even with the scripting step delays, it is possible to create a script which will rapidly cycle a relay. This rapid cycling could result in a over current condition, tripped breaker, or stress to the power controller or attached equipment. To protect against damage to attached equipment or to the power controller, the response time of attached relays is limited by hardware to about ~500ms in newer products. Before running multiple threads, please test your script.

Scripting Commands (Instructions)

Parentheses indicate variables. Enter just the variable without parantheses. For example, AUTOPING 1 will look for the IP address stored in string 1.

AUTOPING (N)

This command enables autoping at the IP address specified in string N. For example, if STRING 1 is 192.168.0.101, AutoPing will run (per the settings on the SETUP page) at that IP address. Note that AutoPing operation begins only after a series of successful pings are used to establish a reliabile connection.

NOP No operation

Useful as a debugging command, delay, or branch target. Causes a delay equal to the program step delay. Equivalent to SLEEP 0

END Ends execution

Terminates thread. Only one thread is stopped.

RUN (L) Create Thread

Create a new execution thread at line number (L)

GOTO (L) Branch
Unconditional branch to line (instruction) number (L)

GOSUB (L) Subroutine Call
Calls a subroutine at line (L) Used with RETURN.

RETURN
Execution will continue on the line following the calling GOSUB after the RETURN instruction is reached. Note: Subroutines are "emulated" by new execution threads. The parent counts as a thread. 63 simultaneous threads are allowed.

ON (NN) Activate Relay
Turns relays on. ie. ON 123 Turns on 1,2,3 leaving 4-8 unaffected (NN) is a list, ie ON 1357 sequentially turns odd outlets on. To prevent excessive inrush currents, the sequence delay timer (On Sequence Delay value in the delay section of the setup page) is used for multi-relay ON instructions.

OFF (NN) Deactivate Relay
Turns relays off, ie. OFF 123 Turns off 1,2,3 leaving 4-8 unaffected. OFF commands act immediately

RESTORE Restores All Relays
Restores all in numeric sequence relays to the settings before power loss, ie."pre-powerloss" state. Sequence delay timing applies.

CYCLE (NN) Cycles Relays
Turns relays OFF, then ON, ie. CYCLE 13 reboots outlets 1 & 3 The relays are off for a period of time specific in the SEQUENCE DELAY field.

SLEEP (T) Sleep Delay
Causes a delay. Delay length can be specified in hours, minutes or seconds. Useful for periodic tasks like weekly reboots. See the scheduling page for more information,
Usage: SLEEP 1 S sleeps for one second
SLEEP 2 H sleeps for two hours
SLEEP 3 D sleeps for 3 days
All numeric ranges are 0-255

LOG ($) Report to Syslog
Sends string variable ($) to a the selected SYSLOG server at the IP specified on the Setup page.

String Variables
A literal string may be entered directly, ie. "HELLO WORLD". A string may also include text generated by the power switch. These strings are automatically generated and updated by the power switch:

- literal "%"
- %a - current Bus A
- %A - voltage Bus A
- %b - current Bus B
- %B - voltage Bus B

- %o - Outlets state in the form “12456” (ON are displayed)
- %O - Outlets state in the form “++-+++--”
- %n - Serial number
- %f - Firmware version
- %d - System time/date
- %M - MAC address of the power controller
- %i - IP address of the power controller
- %m - IP network mask
- %g - IP gateway

TIME ($)

Synchronize with an NTP server specified by its IP address (string $). A special value of 0 is reserved for synchronization with an internal battery powered Real-Time-Clock (RTC) chip, if present. This function is added in firmware versions 1.6.1 and later.

KILL (NNN)

Kills (shuts down) all threads started at line number NNN but the current thread. KILL 0 kills all threads. Available in firmware versions 1.6.x and later.

WAIT ($)

Unlike the SLEEP command which just rests for a period of time, this command waits until a specific time and date (set by the real-time-clock) arrives. Specify a time in the ($) field, and when it matches the clock time, execution will resume on the next line following the WAIT command. This function is available in firmware versions 1.6.x and later. The time format resembles that of a popular crontab entry, five fields separated by spaces. Each field is either an asterisk (meaning any) or a number. This “wildcard” feature lets you start programs periodically, for example once an hour, once a day, once a week, only on Friday the 13, etc. Possible ranges are:

1	Minute	0-59	
2	Hour	0-23	
3	Day of month	1-31	
4	Month	1-12	
5	Day of week	0-7	Sunday is 0 or 7

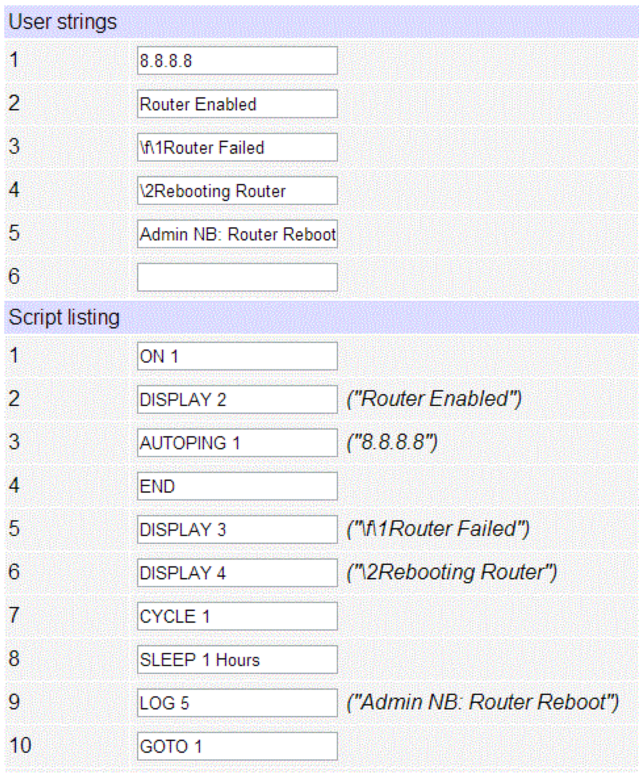
Note, that the condition is satisfied if all fields match. For example the script

```
1 ON 3
2 WAIT 00 12 13 * 5
3 CYCLE 3
4 GOTO 2
```

will reboot the server connected to the circuit 3 each noon Friday the 13th. The cron daemon would treat this time specification differently (each Friday and on the 13th of each month).

Sample Scripts

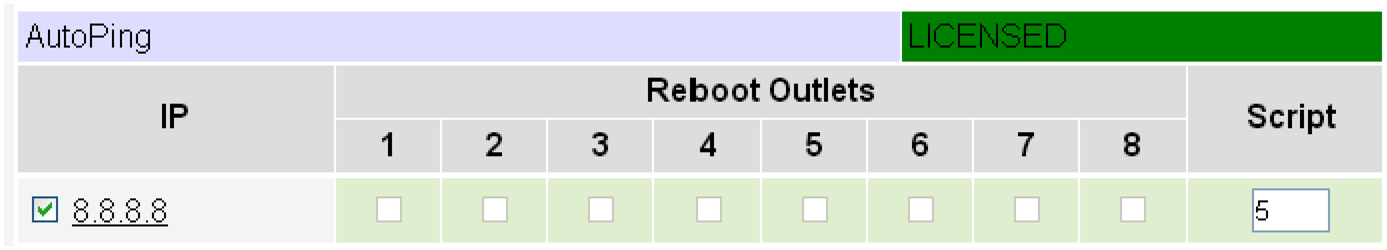
Automatically Reboot a Router, Display the Results, Send a SYSLOG Report



User strings	
1	8.8.8.8
2	Router Enabled
3	\f\1Router Failed
4	\2Rebooting Router
5	Admin NB: Router Reboot
6	

Script listing		
1	ON 1	
2	DISPLAY 2	*("Router Enabled")*
3	AUTOPING 1	*("8.8.8.8")*
4	END	
5	DISPLAY 3	*("\f\1Router Failed")*
6	DISPLAY 4	*("\2Rebooting Router")*
7	CYCLE 1	
8	SLEEP 1 Hours	
9	LOG 5	*("Admin NB: Router Reboot")*
10	GOTO 1	

This script pings through the router to an external server farm, in this case Google's multicast name servers, 8.8.8.8 Lines 1-3 start the autoping process. When the connection is lost (see the AutoPing page), it is assumed that the router has failed, so it is rebooted. Execution on line 5 is triggered by AutoPing settings.



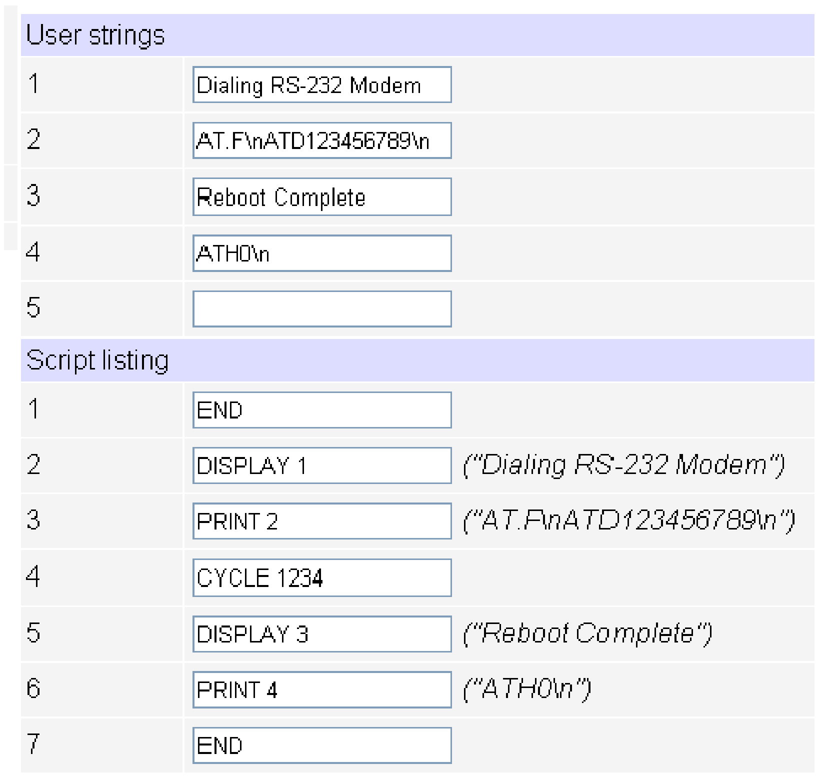
AutoPing LICENSED

IP	Reboot Outlets								Script
	1	2	3	4	5	6	7	8	
✓ 8.8.8.8	☐	☐	☐	☐	☐	☐	☐	☐	5

Line 7 performs the actual reboot by cycling power to circuit #1. Line 8 gives the router and network some time to recover before monitoring starts again. A message is sent via SYSLOG to the admin with the command on line 9.

The program repeats in an infinite loop, and starts automatically on every power-up.

AutoPing Example - Restart Devices and Phone Home



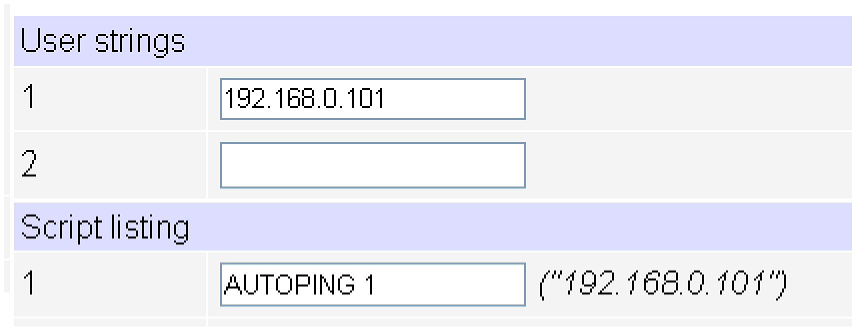
User strings	
1	Dialing RS-232 Modem
2	AT.F\nATD123456789\n
3	Reboot Complete
4	ATH0\n
5	

Script listing		
1	END	
2	DISPLAY 1	*("Dialing RS-232 Modem")*
3	PRINT 2	*("AT.F\nATD123456789\n")*
4	CYCLE 1234	
5	DISPLAY 3	*("Reboot Complete")*
6	PRINT 4	*("ATH0\n")*
7	END	

In this example, a script is started as a result of loss-of-connectivity detected by AutoPing. This script uses an AutoPing failure to reboot equipment and report the failure via dial-up modem connected to the RS-232 port on an Ethernet Power Controller.

Note: Several AutoPing targets can be "joined" so that the task (be it a script or simple outlet[s] reboot) will be performed only if one of the targets responds. "Joining" requires autoping target tasks be identical. Joined targets can be "split" to work individually.

Starting the AutoPing Function on Power-up

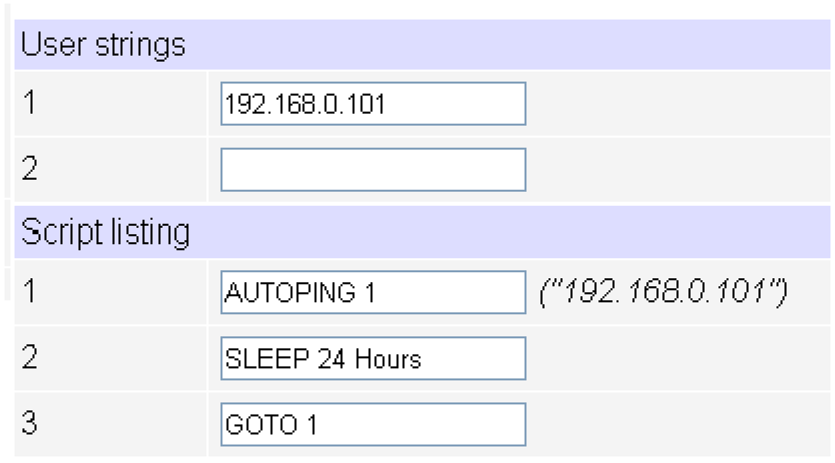


User strings	
1	192.168.0.101
2	

Script listing		
1	AUTOPING 1	*("192.168.0.101")*

This is a common application. Since the program starts automatically on LINE1 after power-up, this program will activate AutoPing on the IP address 192.168.0.101 whenever power is restored.

Starting AutoPing on Power-up and Restarting it Daily



User strings

1	192.168.0.101
2	

Script listing

1	AUTOPING 1	*("192.168.0.101")*
2	SLEEP 24 Hours	
3	GOTO 1	

Since scripts start automatically on LINE1 after power-up, this program will activate AutoPing on the IP address 192.168.0.101 whenever power is restored. It will then "sleep" for a day and restart AutoPing automatically the next day. Useful if a device should be restarted later after it exceeds the "maximum number of attempts to restart" set on the AutoPing page.