Users guide for IP-SwitchBox800

1. Overview

IP-SwitchBox800 can switch the power on or off in 8 230V outlets.
Control is made with a web interface via ethernet or with simple ASCII text commands via RS232. It is also possible to control the RS232 port via Telnet or via a web interface.

On the main page (index.htm) there are buttons for switching on/off the outlets.
On the reset page (reset.htm) there are in addition buttons to make a temporary switching off for a specified time. This time can be configured for each outlet.

At power on the outlets are switched on after a delay. This delay can be configured for each outlet, from 0s up to 600s.
In this way connected equipment can be started in sequence after power failure.
The delays can also be used to reduce the load of the mains fuse. Then a delay of a few tenth of a second is added to each outlet.
The Box can have usernames/passwords for 8 users + admin + telnet.

Each user can have individual access rights for each outlet. The rights can be read, write or no. Admin always has full rights except for telnet.

It is also possible to configure read/write rights for users without passwords.

Chose between Basic Authorization (RFC2617) or Digest Authorization (RFC2617).

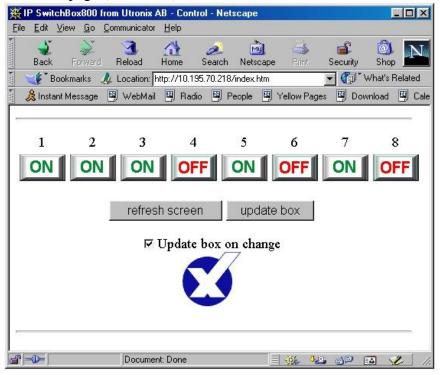You can add names above the buttons on the web pages and at the top of the web pages.

The box can be reserved for one single user at a time. When that user not has accessed the box during the configured time any other user can access it.

There are totally 7 different web pages.
Three are for the users, index.htm, reset.htm and rs232.htm.

The remaining four pages are for configuration of the box and is reached only by admin, they are:

config.htm: For configuration of IP address, port number, title at the user pages, basic or digest authorization, and the time the box is reserved for **one** user.

switches.htm: Here the names of the 8 ON/OFF buttons and the delays at power on and the reset delays is configured.

users.htm: Here usernames and passwords for the 8 users + admin and Telnet is configured.

rights.htm: Here access rights are configured for all users.

2. The main page.

The main page (index.htm) is used to switch the outlets ON/OFF.

When you click at the ON or OFF button a request for this is sent to the box. Then the button turns gray until the box has confirmed the change. When the confirmation arrives the button indicates current setting again. In this way you can be sure that the change request actually has reached the box and been serviced.
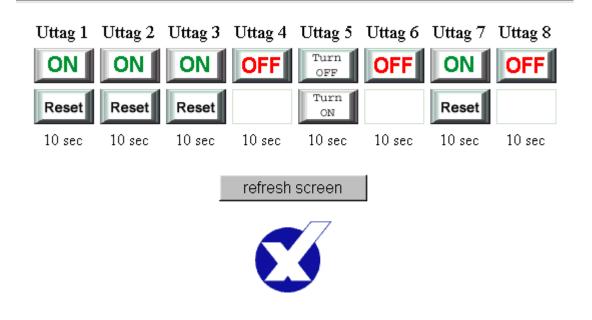
If you click at "refresh screen" then a question about current status is sent to the box. The buttons turns gray until the reply is received. This is particular useful when many user control the box.

In some cases you might like to switch more than one outlet at exactly the same time. The you untick the box "update box on change". The nothing is sent to the box until you click the button "update box".

The digits 1 till 8 above the ON/OFF buttons may be replace by your own text. This is done at the configuration page switches.htm.
A title at top of the page can be configured at the page config.htm.
These changes can only be done after you have logged in as admin, as described in the configuration part below.

3. The reset page.

The reset page (reset.htm) has in addition to the ON/OFF buttons also reset buttons for the outlets in position ON.

On outlet 5 an reset is started. The Reset can be cancelled by clicking "Turn ON" or "Turn OFF".

By clicking a reset button the outlet is switched OFF during a configured time (up to 600s). After that time it is automatically switched ON again.

The switch off time is controlled by IP-SwitchBox800 and is hence not dependent of any delays on the internet.
The time is configured at the configuration page switches.htm.

These changes can only be done after you have logged in as admin, as described in the configuration part below.

During the reset time the "ON" and "Reset" buttons is replaced by two buttons that can cancel the reset, "Turn ON" and "Turn OFF".

During the rest time the browser contacts the IP-Switchbox800 with some seconds interval and updates the buttons. So after the reset time the web page is updated and the "ON" and "Reset" buttons are restored.

4. The Telnet - RS232 page.

You can send and receive characters to/from the RS232 port with any Telnet client, for example Windows HyperTerminal

This remote control may be used to control equipment remotely, for example as console to a computer, UPS or other RS232 connected unit.

To be able to control the RS232 port first the telnet port must be configured to something else than 0.
If not, the RS232 port will be used for local control instead.

The Telenet connection has is own username/password.
More than one user can be active simultaneously with this username.

This is the small Telnet client for the web browser.

At the page RS232.htm there are a small Telnet client. It is a Java applet that starts when you load the page.
In this way you can send and receive text via the RS232 port of the box with your web browser.

Web browsers needs a Java plug in for this function to work. It also requires that your policy file for java security is changed to allow more.
The policy file usually can found at a location like this:
″c:\program\java\j2re1.4.1_01\security\java.policy″. The information to add is *"permission java.lang.RuntimePermission "accessClassInPackage.sun.misc";"*

Usually the most easy way is to use an separate Telnet client software.

5. The configuration pages.

The configuration pages is at config.htm.

5.1 Config main

At config main you configure:
IP address, http port, telnet port, title on the user pages, basic/digest authorization, time to reserve the box for a single user. The MAC address is also showed.

Config main		
Switches	MAC address	00:50:C2:09:60:00
User manager	IP address	10.195.70.218
Access rights	HTTP port	80
	Telnet port	23
Control page	Title	IP-SwitchBox800
Reset page	Authorization	HTTP Basic
	Lock time (0 to 600 sec)	60
		Apply changes

IP address, port number and title.

The IP address is written in common way with dots between.
You can also change port number if you want other port numbers than 80 for http and 23 for Telnet.

After changing IP address/port you have of course to contact the box at the new IP address/port.

As title you can write text that you like to have at the top of the user pages. In front of this text the user name will be placed followed by @.
Without title the username will not be showed.
You can configure a title with a blank only to get the username only at the top the pages.

RARP / BOOTP.
By setting the IP address to 0.0.0.0 the IP-address is allocated by RARP. With 0.0.0.1 BOOTP are used. With 0.0.0.2 both RARP and BOOT is tried.

Security methods.
You can chose between Basic and Digest authorization. Both according to RFC2617.

Basic authorization works with "all" browsers. Digest authorization works with newer Microsoft Explorer. In digest mode you have to log in again after 10 minutes.

Both basic and digest gives a good protection against someone operating IP-switchbox800 by mistake.
Basic gives not much protection against a hacker with access to the network and with evil in mind. Digest gives a very good protection, note though some safety risks mentioned in the security section.

You can configure access rights also for not logged in at the "access rights" web page.

One user at a time.
By writing a time (greater than 0) at "lock time" you prevent access from more than one user at a time. The box is reserved for the user only for the specified time after his last access.
Admin has higher priority and can always access the box, this might lock a present user out.
The configuration is saved by clicking "apply changes".

5.2 Switches

At this page you configure names above the buttons, delay of switch on, and reset times.

	Switch	Switch name (max 32 chars)	Turn on delay (0 to 600 sec)	Reset delay (0 to 600 sec)
Config main	1.	1	0	10
Switches	2.	2	.2	10
User manager	3.	3	.4	10
	4.	4	.6	10
Access rights	5.	5	.8	10
	6.	6	1	10
Control page	7.	7	1.2	10
	8.	8	1.4	10
Reset page				

Apply changes

Above each ON/OFF button you can configure a text of maximum 32 characters.
As long as you add no more than 7 characters the layout will not change. Else the buttons will be adjusted to give space for the text.
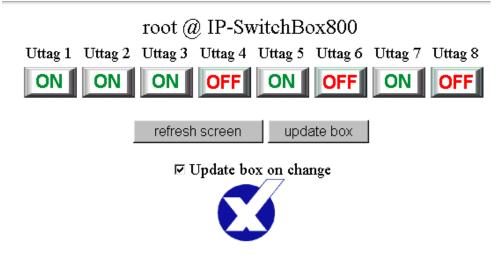
"Turn on delay" is used to delay switch on of the outlets for up to 10 minutes after power failure. This may be used for two purposes.
First to start up equipment in sequence. For example first the printer and then the computer.
Secondly it may be used with delays of just a few tenth of a second delay to reduce the load on the mains fuse. Computers sometimes draws *very* much current (100A) in the moment of switch on. More than one such computer might blow the mains fuse if switched on at the same time. This is avoided by not switching them on at exactly the same time.

"Reset delay" is used to specify the time that the outlets shall be switched of at reset sequences, when clicking at the reset buttons at the web page "reset.htm".
Usually the computer shall have a small delay before being switched on again. A reasonable time can be 10seconds.

root @ IP-SwitchBox800

Uttag 1	Uttag 2	Uttag 3	Uttag 4	Uttag 5	Uttag 6	Uttag 7	Uttag 8
ON	ON	ON	OFF	ON	OFF	ON	OFF

refresh screen   update box

☑ Update box on change

Here names has been added above the buttons and a title is added at top of the page.

5.3 User manager

At this page you specify usernames and passwords for all 8 users and for admin and telnet.
The characters A-Z, a-z and 0-9 may be used.
By leaving it blank at one "Login" the number of users are reduced by one.
By leaving it blank at "Password" no password is required for that user.

	User	Login (max 32 chars)	Password (max 32 chars)
	Administrator	root	root_pwd
	1.	User_1	User_1_pwd
	2.	User_2	User_2_pwd
	3.	User_3	
	4.		
	5.		
	6.		
	7.		
	8.		
	Telnet	telnet	telnet_pwd

Config main
Switches
User manager
Access rights

Control page
Reset page

Apply changes

The box is here configured for admin, telnet plus three users of whom one does not need password.

5.4 Access rights

At this page access rights for all 8 users and for not logged in are configured.
Admin always has full rights.

Config main
Switches
User manager
Access rights

Control page
Reset page

User	Login	Access rights							
		1	2	3	4	5	6	7	8
Administrator	root	r/w	r/w	r/w	r/w	r/w	r/w	r/w	r/w
1.	User_1	r/w	r/w	r/w	r/w	r/w	r/w	r/w	r/w
2.	User_2	r/w	r/w	no	no	no	no	no	r/o
3.		r/w	r/w	r/w	r/o	r/o	r/o	r/o	r/o
4.		r/w	r/w	r/w	r/w	r/o	r/o	r/o	r/o
5.		r/w	r/w	r/w	r/w	r/w	r/o	r/o	r/o
6.		r/w	r/w	r/w	r/w	r/w	r/w	r/o	r/o
7.		r/w	r/w	r/w	r/w	r/w	r/w	r/w	r/o
8.		r/w	r/w	r/w	r/w	r/w	r/w	r/w	r/w
Unauthorized		r/w	r/w	r/w	r/w	r/w	r/w	r/w	r/w

Apply changes

Here User_1 has full rights and so has those not logged in.

Access rights is configured for each outlet.
Choose between:

no - no read or write rights. Corresponding button turns white.
r/o - read only. Present position is showed with slightly grayed ON/OFF buttons.
    The outlets can not be changed.
r/w - read/write. Present position is showed with normal ON/OFF buttons. The outlets can be changed.

6. The RS232 port

The RS232 serial port can be used for three purposes:

1) Remote control of the RS232 port via inter/intranet. By Telnet or browser.
2) Local control of the outlets.
3) Configuring of IP-SwitchBox800.

The configuring mode can always be accessed immediately after power on (0,5s).

After that the port is used either for local control or for the remote control..
This has been selected in the configuration.

6.1 Remote control of the RS232 port

You can connect to the RS232 port of the box with Telnet.
This can be done with any Telnet client or with the browser at rs232.htm .

To be able to use the remote control a port number higher than 0 must have been configured for Telnet.
If port 0 is configured then the RS232 port is used for local control.
Usually port 23 is used for Telnet communication.

After approx 5 minutes of inactivity an internal timer automatically disconnects the Telnet connection.

6.2 Local control via RS232.

The IP-Switchbox is controlled by simple text (ASCII) commands via an RS232 port.
To be able to use the local control the portnumber for Telnet has to be configured to 0 (=Telnet not enabled).

Use a terminal or a computer with terminal program for the local controlling, for example Windows "Hyper Terminal".
The communication parameters is 9600baud, 8 data bits, no parity, one stop bit, no handshake.
Connection to a PC is done with a "straight cable" (that is with pin 1 to pin 1, 2 to 2 etc).

The control commands are:

Switch on outlet x:	ONx	example: ON1
Switch off outlet x:	OFFx	example: OFF2
Make reset on outlet x:	Rx	example: R3
Ask about present positions:	?	The answer is, for example, 11100110 .
		That is 1 for outlets switched ON and 0 for outlets switched off.

6.3 Configuration via RS232.

IP-Switchbox800 may be configured via RS232.

You find the configuration mode by keeping the key "c" down on keyboard at the same time as you switch on the power (five "c" within the first 0,5 seconds).
A menu will then appear that shows some of the settings and a small menu for the other settings.

```
Welcome to the IP address configurator for IP-SwitchBox800
==========================================================
Version: 3.00 (Dec 11 2005 00:26:56)


MAC    = 00-50-C2-09-60-00
IP     = 10.195.70.218
PORT   = 80
TELNET = 23
DIGEST = 0
LOCK   = 60.00 seconds
To display settings, type:
        "T" for names at web page.
        "R" for reset times.
        "S" for turn on delays.
        "U" for user names.
        "W" for passwords.
        "A" for access rights.
        "Z" for IP, Port number and MAC.
>
```
Change the setting by, for example, write:

MAC=   The serial number and Ethernet address of the box. Can not be changed.
IP=10.195.70.218 The digits are replaced by the new IP address.
Port=80   The digits are changed to the new port number.
Telnet=23   Telnet access is done at port 23. 0=RS232 port is used for local control instead..
Digest=0   0=Basic authorization, 1=Digest authorization
Lock=60   The box is reserved for the user during 60 seconds after last access..
                  Other users can read the box all the time though.

T0 =Title   Write the title to be placed at the top of the web pages.
T1=Outlet1   Write the text to be placed above the ON/OFF button 1.
T2=Outlet2   Write the text to be placed above the ON/OFF button 2. etc
The outlet can have text labels with up to 32 characters. Up to seven characters can be specified without changing the layout of the web page.

U1=User1   Write the username for user 1. etc. Use U0 for admin.
W1=Password1   Write the password for user 1. etc. Use W0 for admin.
R1=10   Specify reset time for outlet 1 in seconds. etc
S1=0,2   Specify delay for outlet 1 at power on. etc
A=wwrrnnnr   Specify the access rights for up to 8 users + those not logged in (ninth
                  user). w = read and write rights, r= read rights, n= no rights.
Z   Prints the start menu as above again. Good for checking the settings.

Write one of T,U,W,R,S,A,Z followed by <CR> to print the settings on the screen.
All those command shall be ended with <CR>.

The configuration mode must be quited with "q" to leave the configuration mode.
You *have to* leave the configuration mode to control the box in normal way again.

7. More than one user at a time.

More than one user can control the IP-Switchbox800 at the same time.
This may be confusing, especially if the reset function is used. If one user operates an outlet while it's doing a reset the reset function will be cancelled and the outlet will be in the requested position.

To avoid complications with two or more users interfere with each other there are a setting in the configuration for the minimum time that must pass after one user has operated the box until another user can operate it. See 5.1 "Lock" above.
The remote control of the RS232 port via Telnet can always be accessed by many users.

8. Security aspects.

Basic authorization gives usually sufficient security. It has the advantage of working with "all" browsers.

Digest authorization gives higher security. However there are two security risks with it.

The first risk is that some browsers (Netscape4) ignores the request for digest mode and sends the username and password as basic anyway. We will not receive the high security we expected.
The IP-Switchbox does not accept this so the user will notice it and learn to use a suitable browser.

The security in digest mode uses "checksum" that is sent with every transmission. This checksum is extremely difficult to forge so a hacker can not control the box.
The message itself is transmitted with out any cipher. The second security risk is that when configuring the usernames/passwords via inter/intranet the passwords is transmitted without cipher. A hacker then can read the passwords during the configuration!!
The hacker must be very alert to find the moment when you configure the passwords though.
For maximum security you have to configure the passwords locally via RS232 or via a local network that you trust.

9. Controlling from your own software.

You can control the IP-SwitchBox from your own programs. Http is used.
There are two "commands" for this, k0 and k1.

Reading.
Send a http request for k0 to get current status.
The reply consists of 9 bytes in hexadecimal format:
Byte 1 and 2   Tells the setting of the outlets for example," 31"(0x33, 0x31) tells that outlets 1, 5 and 6 are on.
Positions without read rights are reported as off.
Byte 3 and 4   Tells which outlets that currently are doing reset.
Byte 5 and 6   Tells the read rights. For example, 0F (0x30, 0x46) tells that you have read rights on outlet 1,2,3 and 4.
Byte 7 and 8   Tells the write rights in the same way.
Byte 9   Is 0 (0x30) if the box is available for control and is 1 (0x31) if the box is reserved for another user.

Example:
By sending "*GET /k0*" via http we get the answer "3100FF0F0" that means that outlets 1,5 and 6 are on, that we have read rights on all 8 outlets, that we have write rights on outlet 1,2,3,4 and that we may write to the box.

Control.
To control the box a http request for k1aabbccdd is sent. Where a,b,c,d are the parameters.

aa   Bit mask for switch on.   Two bytes of hexadecimal values (0..F).
                                  A bit set to 1 means that the corresponding outlet shall be switched on. *(for example. "F1" means that outlet 1,5,6,7,8 shall be on)*

bb   Bit mask for switch off.   Two bytes byte of hexadecimal values (0..F). A bit set to 1 means that the corresponding outlet shall be switched off.
                                  The bit mask for switch on has higher priority than the bit mask for switch off.
                                  If both the bit for switch on and switch off is set to 1 the outlet will be on.

cc   Bit mask for reset.   Two bytes of hexadecimal values (0..F). A bit set to 1 means that the corresponding outlet shall make a reset sequence.

dd   Bit mask for   Two bytes of hexadecimal values (0..F). A bit set to 1 means that the
       canceling reset.   reset sequence for the corresponding outlet shall be canceled. The bit mask for cancel have higher priority than the bit mask for reset.

Example: By sending "*GET /k1F1FF00FF*" via http:
We switch on outlet 1,5,6,7 and 8.
We switch off other outlets that might have been on before.
We do not start any reset sequence.
We cancel all current reset sequences.

One example in Perl on how to use those commands can be found at the demo CD in Unix\switchbox.pl.
The outlets are there changed in sequence just to demonstrate it.
The code is meant to be changed by the user for other purposes.

The same can of course be done in other programming languages.
You have to change to current IP address for the box in the file switchbox.pl to make the example work.
It is also possible to run the script in Windows environment by using, for example, ActivePerl.
On the CD there are also an example in Visual Basic.

10. Default settings.

IP address: 10.195.70.218

Port, http: 80

Port, telnet: 23

Title at web page: No title.

Authorization: Basic.

Lock time: 0

Name at buttons: 1,2,3,4,5,6,7,8

Turn on delay: 0/0,2/0,4/0,6/0,8/1,0/1,2/1,4s

Reset delay: 10s

Username/Password.
    admin: root/root_pwd   Change this to prevent unauthorized use.
    user1-8:   1/2/3/4/5/6/7/8   No Usernames/Passwords.

Access rights:
    user1-8:   No access rights.
    unauthorized: Full rights on all outlets.

11. Technical specifications.

Mains connections:

Mains voltage	230V
Max current:	16A
Connector in:	Appliance inlet (IEC320/C20).
Max current out:	16A optionally distributed over the outlets.
Max switch on current:	120A/20ms.
Outlets:	Standard Schucko.
Power consumption:	Approx 10W.

Signal connections.

RS232.

9-pol D-sub connector with sockets.
Data in at socket 3. Data out at socket 2. Signal ground at socket 5.
A common straight cable mat be used for connection to PC.
9600 Baud, 8 data bits, no parity, one stop bit, no handshake.

Ethernet.

10/100M TP
Straight cable is used for connection to hub.
Crossed cable is used for connection to PC.
Yellow control lamp: Lit with 100Mbit connection, unlit with 10Mbit.
Green control lamp: Normally on. Momentary off at communication (100ms).
Red control lamp: Lit at full duplex, unlit at half duplex..

Dimensions:

Width: 482mm (19")
Depth: 170mm exkl. connectors.
Height: 88mm (2HE)
Weight: 3,1kg

12 Getting started! Quick start for control via web interface!

a)   Configure the IP address.
    To get contact with the box via ether/internet you first have to configure a suitable IP address.
    The IP address you get from your ether/internet administrator.
    The IP address configuration can only be done via RS232.*)
    For that you need, for example, a PC with terminal program like Windows Hyper terminal.
    Configure: right COM port, 9600baud, 8 data bits, no parity,
    1 stop bit, no handshake.

    Connect the IP-SwitchBox800 with a straight (connection pin 1 to 1, 2 to 2etc) 9-pole serial
    cable to the computer.
    (to the same port as the terminal is configured to!). Use for example the supplied cable.
    (It is now possible to control the box from the terminal with "ON1", "ON2", "OFF1" etc.)

    Keep the key "c" down at the same time as you switch on the power to IP-Switchbox800.
    Then a setup menu is printed that shows current settings.
    Type the IP address like this; IP=10.195.70.218 and push return, the digits shall of course be replaced
    by desired IP address. The box answers with the new address.
    It is necessary to leave the setup menu by pushing "q" (like quit) to control the box in normal way.

b)   Connect IP-SwitchBox800 to the network.
    The supplied blue cable is a "straight" cable that is used for connection to hubs, the most common
    connection.
    If you like to connect directly to the computers network card then you need a "crossed" cable.
    They often have red connectors.

c)   Start the browser.
    Type the address, for example, http://10.195.70.218 (replace the digits with the configured IP address).
    Now the browser shall display the main page with the control buttons and you can control the box.

Common control is made from the default page /index.htm.
Control with reset is made from /reset.htm.
Remote control of the RS232 port can be made with separate Telenet client softwares.
Configuring is made from /config.htm. Then you have to log in as admin.
Default admin username is "root" password is "root_pwd".
This password **should immediately be replaced** to unique password for security reasons.

*) It is possible to change IP address from the web pages too. Then you have to have a network from where
you can reach the default IP address of the box: 10.195.70.218.

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