eBOX GPI8

Ethernet to GPI Interface



Users Manual

JC COOPER ELECTRONICS

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Introduction

The eBOX GPI8 is a general purpose interface box that converts 8 GPI (General Purpose Interface) inputs and outputs to 100/10baseT Ethernet.

The eBOX GPI8 communicates over standard TCP/IP which allows is be used with any host computer running any operating system that uses TCP/IP protocol. The eBOX GPI8 can also be connected to other eBOX GPI8es to allow longer runs than traditional GPI cables. Since the eBOX GPI8 uses TCP/IP, traffic can be routed over internal LANs, wireless LANs, MANs, WANs and even over the public Internet.

Items such as IP address, remote IP address and TCP port are set using the eBOX Configuration Utility. Settings are stored in nonvolatile memory.

Typically, the eBOX GPI8 functions as a server, passively waiting for client devices to connect to it. The device can be a computer or another eBOX GPI8 configured as a client. When the eBOX GPI8 is configured as a client, it will actively attempt to connect to the server eBOX GPI8. Once this is accomplished, the either eBOX GPI8 will pass data received from the GPI ports to the remote eBOX GPI8.

Setup

Unpacking

The eBOX GPI8 package will contain the following items:

- eBOX GPI8
- Power Supply
- This Users Manual
- Four rubber feet

Connections

The eBOX GPI8 connections are straightforward:

1. Plug the power supply into the eBOX GPI8.
2. Plug a network cable into the Ethernet jack.
3. Connect GPI cables into GPI ports.

Operating Modes

The eBOX GPI8 has five distinct modes of operation that are set by the rear panel DIP switches. The DIP switches are read only at power on so the eBOX GPI8 must be power cycled for the changes to take effect.

SW8	SW7	SW5	
On	X	Off	Not used
Off	Off	Off	eBOX GPI8 is server at address specified on next page
Off	On	Off	eBOX GPI8 is client at address specified on next page
Off	On	On	Not availaible
Off	Off	On	eBOX GPI8 performs GPI to Ethernet conversion

X = Don't Care

Mode Configuration

eBOX GPI8 Server Mode

When the eBOX GPI8 is in the server mode, it waits for a client to connect to it. The client can be another eBOX GPI8 in client mode or it can be a computer based application. The IP address and TCP port of the eBOX GPI8 is set by DIP switches 1, 2 and 3.

Note: The eBOX GPI8 must be power cycled to switch to this mode.

eBOX GPI8 Client Mode

When the eBOX GPI8 is set to client mode, it actively attempts to connect to another eBOX GPI8 in server mode. The IP address and TCP port of the eBOX GPI8 is set by DIP switches 1, 2 and 3.

Note: The eBOX GPI8 must be power cycled to switch to this mode.

GPI to Ethernet Conversion

When the eBOX GPI8 is in GPI to Ethernet Conversion Mode, it converts GPI inputs into Ethernet messages specifically for Doremi V1 and MCS video servers. The IP address of the eBOX GPI8 is set by DIP switches 1, 2 and 3 plus one. The TCP port is fixed at 8000. The eBOX GPI8 GPI Programmer Software allows you to edit and upload the commands that are sent when GPI inputs are triggered.

When the eBOX GPI8 operates as a GPI to Ethernet Converter, it will send to the Doremi server status requests on a periodic basis. Replies from the server will be used to establish the state of some of the GPI Output pins, acting as tally lines. Refer to the section regarding GPI Outputs in GPI Conversion Modes.

Note: The eBOX GPI8 must be power cycled to switch to this mode.

Resetting eBOX GPI8 Settings

The eBOX GPI8 settings can be forced to factory defaults by using the reset button. The reset button is located behind the front panel. It can be accessed via the small, unmarked hole to the right of the Port 4 Send LED. The arrow in the picture below shows the location of the hole for the reset button.



To reset the eBOX GPI8 to factory defaults, simply press the button with a long, thin object such as a paper clip and turn the power on. The reset button can be released after the 5 Send and 5 Receive LEDs stop flashing.

The eBOX GPI8 factory defaults are:

IP Address	192.168.254.102
Subnet Mask	255.255.255.0
Gateway Address	192.168.254.198
TCP Port	23
Destination IP Address	192.168.254.103
Destination TCP Port	5000
Password	*password*

eBOX GPI8 Settings After Reset

After the eBOX GPI8 settings are reset in this manner, you must power cycle the eBOX GPI8 to load those settings.

Initial Hardware Configuration

IP Address

The IP Address of the unit depends on the position of DIP switches 1, 2 and 3. This is detailed in the table below. The address box can accommodate numeric (nnn.nnn.nnn.nnn) or alphanumeric (domain.name.com) network locations.

SW3	SW2	SW1	SW7	Mode	IP Address
Off	Off	Off	Off	Server	192.168.254.102
Off	Off	Off	On	Client	192.168.254.103
Off	Off	On	Off	Server	192.168.254.104
Off	Off	On	On	Client	192.168.254.105
Off	On	Off	Off	Server	192.168.254.106
Off	On	Off	On	Client	192.168.254.107
Off	On	On	Off	Server	10.0.0.128
Off	On	On	On	Client	10.0.0.129
On	Off	Off	Off	Server	10.0.0.130
On	Off	Off	On	Client	10.0.0.131
On	Off	On	Off	Server	10.0.0.132
On	Off	On	On	Client	10.0.0.133
On	On	Off	Off	Server	172.16.0.128
On	On	Off	On	Client	172.16.0.129
On	On	On	Off	Server	Set by user, Default=192.168.254.102
On	On	On	On	Client	Set by user, Default=192.168.254.102

IP Address Configuration for eBOX GPI8

eBOX GPI8 Configuration Utility

The eBOX GPI8 to be configured while the eBOX GPI8 is in use and avoids any compatibility issues with web browsers. This is the recommended way to configure the eBOX GPI8.

To allow easy configuration of the eBOX GPI8, JLCooper has provided a small Windows utility. The eBOX GPI8 Configuration Utility is shown below.



To use the utility, simply install and launch it.

eBOX GPI8 to Configure

In this section, enter the IP Address, TCP Port and Password of the target eBOX GPI8 that you wish to configure.

IP Address

This is IP Address of the target eBOX GPI8 to configure.

TCP Port

This is the TCP Port of the target eBOX GPI8 to configure. The TCP Port for configuration is fixed at 4141. In most circumstances, you will never have to change this however, if the eBOX GPI8 is behind a router using port forwarding, you may have to specify a different port.

Password

If DIP switch 6 is set to the down position, the eBOX GPI8 uses a password to prevent unauthorized access. The default password is '*password*'.

> *Note: If the Password box contains any text, the eBOX GPI8 Configuration Utility will pad out the password with spaces and truncate the password to 8 characters. If the Password box is empty, the eBOX GPI8 Configuration Utility will send no password.*

eBOX GPI8 Password Change

This section allows you to change the password of the eBOX GPI8. Remember, if DIP switch 6 is set to the down position, the eBOX GPI8 requires the correct password in the '*eBOX GPI8 to Configure*' section. The default password is '*password*'.

New Password

This is the area to enter a new password. The password can be up to 8 characters in length.

Update Password

Clicking on this button sends the new password to the eBOX GPI8.

> *Note: The eBOX GPI8 Configuration Utility will pad out the password with spaces and truncate the password to 8 characters even if the Password box is empty.*

eBOX GPI8 Settings

This section allows you to change the operational settings of the eBOX GPI8 Ethernet interface. These settings are identical to the settings that appear on the configuration web page.

Device IP Address
IP address of this eBOX GPI8 when SW1, SW2 and SW3=On.

Subnet Mask
The mask is a binary pattern that is matched up with the IP address to turn part of the host ID address field into a field for subnets.

Gateway Address
IP address of gateway router that connects to other networks.

Port Number
TCP port of this eBOX GPI8 when SW1, SW2 and SW3=On.

Destination IP Address
IP address of remote eBOX GPI8 when SW1, SW2 and SW3=On. This is used when eBOX GPI8 is configured as a client (SW7=On).

Destination Port Number
TCP port of remote eBOX GPI8 when SW1, SW2 and SW3=On. This is used when eBOX GPI8 is configured as a client (SW7=On).

Password
Eight character alphanumeric password that is embedded in the Ethernet packet that prevents unauthorized eBOX GPI8es from passing unintended packets. If the password protection feature is enabled (SW6=Off) on either eBOX GPI8, then both eBOX GPI8es must have the same password.

Baud Rate
This parameter is not used in the eBOX GPI8.

Parity and Parity Type
This parameter is not used in the eBOX GPI8.

Serial Time Out
This parameter is not used in the eBOX GPI8.

Max Buff Size

This parameter is not used in the eBOX GPI8.

Configuration with Web Page Interface

Note: The ability to configure the eBOX GPI8 with the eBOX GPI8 Configuration Utility while the eBOX GPI8 is in use was added. For this reason, using the eBOX GPI8 Configuration Utility to configure the eBOX GPI8 is the recommended method to configure the eBOX GPI8.

When SW8 is set in the 'On' position, the eBOX GPI8 allows access to the configuration web page. On this page, various settings such as port rate and parity, IP addresses and ports, and password can be modified.

Note: The eBOX GPI8 will not send GPI messages when the eBOX GPI8 is set to configuration mode.

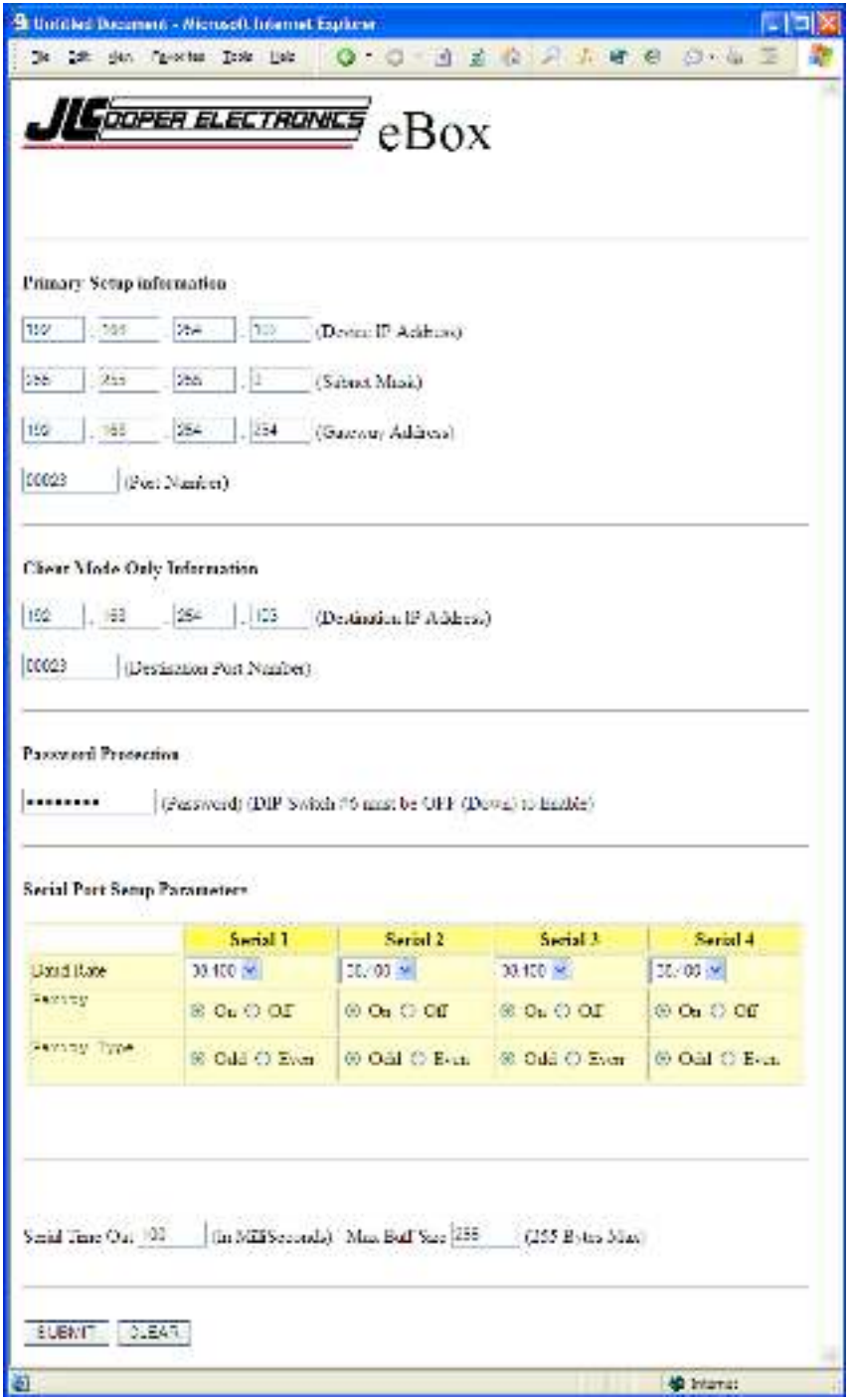
This page is accessed by setting SW8 to the 'On' position and typing http://192.168.254.102 into your web browser. During this time, the normal operation of the eBOX GPI8 is suspended. Make any changes that are necessary for your system and click on SUBMIT. These changes are stored in nonvolatile memory and are loaded at power up.

Note: The configuration web page is always set to 192.168.254.102 regardless of the state of the DIP switches.

Note: In the configuration mode, the subnet mask is set to 255.255.255.0. This means that the eBOX GPI8 will only see traffic from computers with and IP address of 192.168.254.nnn. You will need to change your computers IP address to 192.168.254.nnn where nnn = any number except 0, 102 and 255. This will allow your computer to access the configuration page of the eBOX GPI8.

Switch SW8 to the 'Off' position and power cycle the eBOX GPI8 so the changes are loaded.

The configuration web page is shown on the next page.


Untitled Document - Microsoft Internet Explorer
JC COOPER ELECTRONICS eBox
Primary Setup Information
(Device IP Address)
(Subnet Mask)
(Gateway Address)
(Port Number)
Client Mode Only Information
(Destination IP Address)
(Destination Port Number)
Password Protection
(Password) (DIP Switch #5 must be OFF (Down) to Enable)
Serial Port Setup Parameters
Serial 1
Serial 2
Serial 3
Serial 4
Baud Rate
Parity
Parity Type
Odd
Even
Serial Time Out
(in MilliSeconds)
Max Buff Size
(255 Bytes Max)
SUBMIT
CLEAR

Operational Settings

Device IP Address
IP address of this eBOX GPI8 when SW1, SW2 and SW3=On.

Subnet Mask
The mask is a binary pattern that is matched up with the IP address to turn part of the host ID address field into a field for subnets.

Gateway Address
IP address of gateway router which connects to other networks.

Port Number
TCP port of this eBOX GPI8 when SW1, SW2 and SW3=On.

Destination IP Address
IP address of remote eBOX GPI8 when SW1, SW2 and SW3=On. This is used when eBOX GPI8 is configured as a client (SW7=On).

Destination Port Number
TCP port of remote eBOX GPI8 when SW1, SW2 and SW3=On. This is used when eBOX GPI8 is configured as a client (SW7=On).

Password
Eight character alphanumeric password that is embedded in the Ethernet packet that prevents unauthorized eBOX GPI8es from passing unintended packets. If the password protection feature is enabled (SW6=Off) on either eBOX GPI8, then both eBOX GPI8es must have the same password.

Baud Rate
This parameter is not used in the eBOX GPI8.

Parity and Parity Type
This parameter is not used in the eBOX GPI8.

Serial Time Out
This parameter is not used in the eBOX GPI8.

Max Buff Size
This parameter is not used in the eBOX GPI8.

eBOX GPI8 Security

The eBOX GPI8 contains a basic security mechanism that prevents unintended hosts or eBOX GPI8es from passing data through a secured eBOX GPI8. An eBOX GPI8 can be protected with password that is set on the configuration web page. The password is stored in nonvolatile memory and, is read upon power up.

When password protection is enabled, the sending eBOX GPI8 embeds the password in the transmitted IP packet. At the remote end, the receiving eBOX GPI8 must have password protection enabled AND have a matching password.

The DIP switches are read only at power on so the eBOX GPI8 must be power cycled for any changes to take effect.

This security mechanism is only used in eBOX GPI8 Server and eBOX GPI8 Client modes. SW6 should be set to the off position when used in the GPI to Ethernet modes.

SW6	
On	Disable password protection
Off	Enable password protection

Security Configuration

The effect of SW6 takes place immediately.

Note: If an eBOX GPI8 has password protection is disabled, it will ignore the password and act on any packets sent to it.

eBOX GPI8 IP Address

The IP address of the eBOX GPI8 can be set by the rear panel DIP switches or by the internal web page. As above, the DIP switches are read only at power on so the eBOX GPI8 must be power cycled for the changes to take effect.

Here is a table of how IP address and the TCP port are set with the DIP switches in eBOX GPI8 Server and eBOX GPI8 Client modes.

SW3	SW2	SW1	SW7	Mode	IP Address	Port
Off	Off	Off	Off	Server	192.168.254.102	23
Off	Off	Off	On	Client	192.168.254.103	23
Off	Off	On	Off	Server	192.168.254.104	23
Off	Off	On	On	Client	192.168.254.105	23
Off	On	Off	Off	Server	192.168.254.106	23
Off	On	Off	On	Client	192.168.254.107	23
Off	On	On	Off	Server	10.0.0.128	23
Off	On	On	On	Client	10.0.0.129	23
On	Off	Off	Off	Server	10.0.0.130	23
On	Off	Off	On	Client	10.0.0.131	23
On	Off	On	Off	Server	10.0.0.132	23
On	Off	On	On	Client	10.0.0.133	23
On	On	Off	Off	Server	172.16.0.128	23
On	On	Off	On	Client	172.16.0.129	23
On	On	On	Off	Server	Set by user	
On	On	On	On	Client	Set by user	

IP Address Configuration for eBOX GPI8 Server and eBOX GPI8 Client modes

Here is a table of how IP address and the TCP port are set with the DIP switches in eBOX GPI8 GPI to Ethernet conversion modes.

SW3	SW2	SW1	IP Address	Port
Off	Off	Off	192.168.254.103	8000
Off	Off	On	192.168.254.105	8000
Off	On	Off	192.168.254.107	8000
Off	On	On	10.0.0.129	8000
On	Off	Off	10.0.0.131	8000
On	Off	On	10.0.0.133	8000
On	On	Off	172.16.0.129	8000
On	On	On	Set by user	8000

IP Address Configuration in GPI conversion modes

Unused Switches

Switch 4 is currently not used.

GPI Outputs in GPI Conversion Modes

GPI Outs

When the eBOX GPI8 operates as a GPI to Ethernet Converter, it will send to the Doremi server status requests on a periodic basis. Replies from the server or deck will be used to establish the state of some of the GPI Output pins, acting as tally lines. The pins are presently defined as:

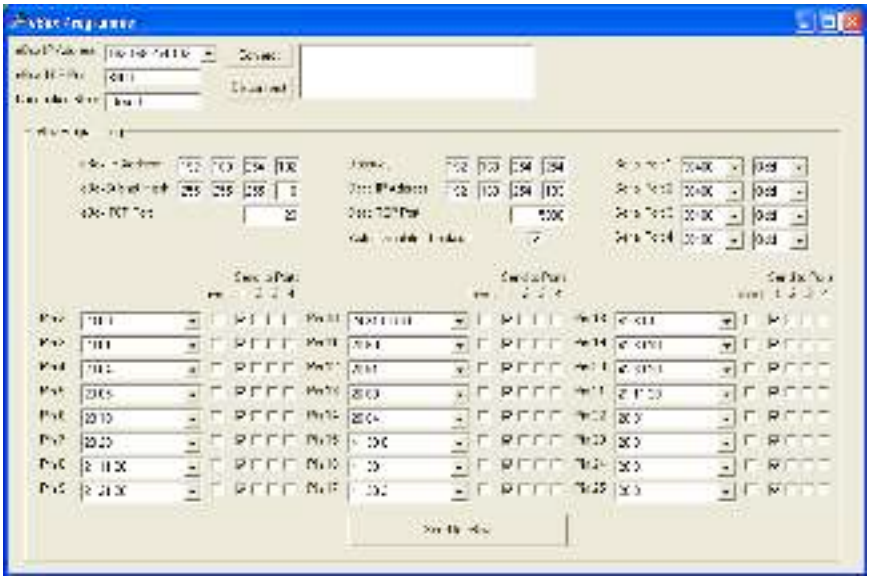
Pin	Tally Function	Pin	Tally Function
1	Ground	14	Jog
2	Play	15	Shuttle
3	Record	16	-
4	Fast Forward	17	Servo Lock
5	Rewind	18	A1
6	-	19	A2
7	Stop	20	TC
8	-	21	-
9	Standby	22	Video
10	Cue Up	23	Assemble
11	Still	24	Insert
12	Forward Direction	25	-
13	Varispeed		

GPI Tally Outputs in GPI Conversion Modes

Note: by default, the GPI Input pins are active low or 0 volts. That is, events are triggered when the GPI Inputs are connected to ground or driven to zero volts. This behavior can be modified with the eBOX GPI8 GPI Programmer Software.

GPI Programmer Software

The GPI Programmer Software pictured below allows you to program custom messages and behaviors when the eBOX GPI8 is in either eBOX GPI8 GPI to Ethernet conversion mode.



eBOX GPI8 IP address

This is the IP address of the eBOX GPI8 you want to configure.

eBOX GPI8 TCP Port

This is the TCP port of the eBOX GPI8 you want to configure. The eBOX GPI8 TCP port in the GPI to Ethernet conversion modes is fixed to TCP port 8000.

Connection State

This window shows the status of the connection to the eBOX GPI8 you want to configure.

Connect / Disconnect

This allows you to establish or break the connection to the eBOX GPI8 you want to configure.

Status Window
This window shows additional status messages of the connection to the eBOX GPI8 you want to configure. In addition, you will also see the firmware version of the connected eBOX GPI8.

eBOX GPI8 Programming
The parameters in this box are settings that will be downloaded into the eBOX GPI8.

eBOX GPI8 IP address
This will be the IP address of this eBOX GPI8 when SW1, SW2 and SW3=On.

Subnet Mask
This will be the subnet mask of the eBOX GPI8.

Gateway Address
This will be the IP address of gateway router which connects to other networks.

Port Number
This will be the TCP port of this eBOX GPI8 when SW1, SW2 and SW3=On.

Destination IP Address
IP address of remote eBOX GPI8 when SW1, SW2 and SW3=On. This is used when eBOX GPI8 is configured in the GPI to Ethernet mode or the eBOX GPI8 is in client mode.

Destination Port Number
TCP port of remote eBOX GPI8 when SW1, SW2 and SW3=On. This is used when eBOX GPI8 is configured in the GPI to Ethernet mode or the eBOX GPI8 is in client mode.

Auto Calculate Checksum
Automatically appends a Sony type checksum to the end of each message.

Suppress Header and Status Request
This disables Doremi message headers and VTR status requests. Doing this allows you to use the eBOX GPI8 in applications that do not involve a VTR.

Serial Ports Baud Rate
This parameter is not used in the eBOX GPI8.

Serial Ports Parity / Type
This parameter is not used in the eBOX GPI8.

GPI Pins
These are the pins on the GPI Input connector.

Commands
These are the commands that are sent when the GPI input is triggered. The command can be triggered on either transition which is set by the invert checkbox described below. Each byte must be a two digit hexadecimal number.

Invert
Normally messages are triggered when a GPI input pin is shorted to ground. Checking this box allows the messages to be triggered when a GPI input pin is opened or is driven to +5 volts.

Send to Ports
This parameter is not used in the eBOX GPI8.

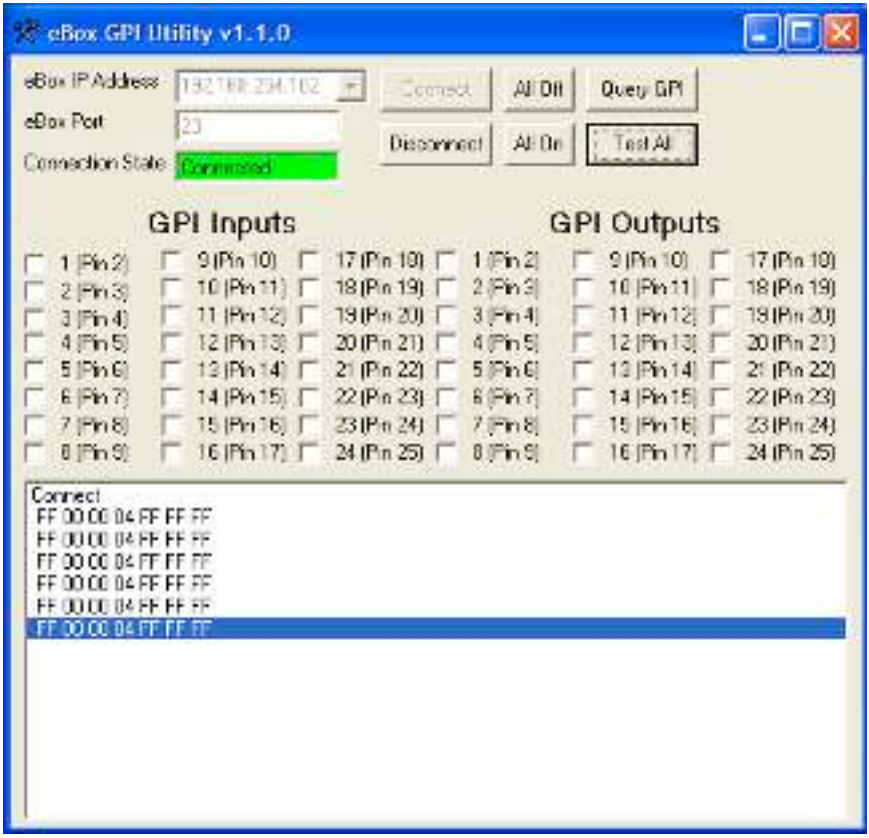
Send to eBOX GPI8
Clicking this button downloads all the parameters to the eBOX GPI8. During the download, the eBOX GPI8 will momentarily stop responding to GPI inputs. This is normal. The message mapping will be effective immediately. However, changes to the IP settings take effect after a power cycle.

eBOX GPI8 GPI Tester Utility

The GPI Tester Utility pictured below allows you to perform basic tests with your eBOX GPI8, eBOX I/O (if equipped) and connected customer equipment. This is intended to be a diagnostic tool to aid you in setting up a server eBOX GPI8. The GPI Tester Utility can be used to connect to an eBOX GPI8 configured for server mode.

The GPI Tester Utility can not connect to an eBOX GPI8:

- When configured as a client eBOX GPI8,
- When configured as a GPI to Ethernet converter or,
- When connected to another eBOX GPI8 or application.



eBOX GPI8 IP address
This is the IP address of the eBOX GPI8 you want to test.

eBOX GPI8 TCP Port
This is the TCP port of the eBOX GPI8 you want to test. The eBOX GPI8 TCP port in the server mode is TCP port 23 by default. This can be configured for any TCP port.

Connection State
This window shows the status of the connection to the eBOX GPI8 you want to test.

Connect / Disconnect
This allows you to establish or break the connection to the eBOX GPI8 you want to test.

Status Window
This window shows additional status messages of the connection to the eBOX GPI8 you want to test. In addition, you will also see the firmware version of the connected eBOX GPI8.

GPI Inputs
These checkboxes indicate the state of the input pins on the GPI Input connector. A check mark indicates that the corresponding pin is in the active state (logic low or 0 volts). The absence of a check mark indicates that the corresponding pin is in an inactive state (logic high or 5 volts). Clicking on a checkbox will cause the eBOX GPI8 GPI Tester Utility to send a GPI Query command to update the state of the checkbox.

GPI Outputs
Sets selected GPI Output to active state (logic low or 0 volts). All other GPI Outputs are set to inactive state (logic high or 5 volts).

All Off
Sets all GPI Outputs to inactive state (logic high or 5 volts).

Test All

Sets all GPI Outputs to the inactive state (logic high or 5 volts) and sets each GPI Outputs to the active state (logic low or 0 volts) one by one in succession as shown below.

$$1 \rightarrow 2 \rightarrow 3 \ldots 22 \rightarrow 23 \rightarrow 24 \rightarrow 1 \rightarrow 2 \rightarrow 3 \ldots$$

Clicking the button again will stop the sequence.

Query GPI

An eBOX GPI8 sends a GPI Status message in any of the following cases:

- whenever any of its GPI Inputs change states,
- periodically every 5 seconds or,
- when a GPI Query command is received.

Clicking the Query GPI button sends a GPI Query command to the connected eBOX GPI8 causing the eBOX GPI8 to immediately return the states of its GPI Inputs. Clicking the Query GPI button is a good way to verify that the eBOX GPI8 GPI Tester Utility is still connected to the eBOX GPI8 under test.

Note: The eBOX GPI8 GPI Utility does not use the Password protection feature of the eBOX GPI8 so that feature will have to be disabled by setting DIP switch 6 to the 'ON' position.

eBOX GPI8 Software for Apple Mac

Installation

The installer puts the folder **eBOX GPI8** in the /Applications folder. This folder contains the **eBOX GPI8 Control Center** application and the **eBOX GPI8 Uninstaller**. The installer also places **eBOX GPI8_StartupItem** in /Library/StartupItems and **eBOX GPI8MidiDriver** in /Library/MIDI Drivers.

To uninstall run the **eBOX GPI8 Uninstaller** located in /Applications/eBOX GPI8. Select the items to uninstall, then click on the **Uninstall** button.

> *NOTE: Currently the uninstaller is unable to remove the **eBOX GPI8 Control Center** application.*

Operation

After restart run eBOX GPI8 Control Center. This application serves as the editing application just like the applications for our control surfaces. However, it also can be used as a front end for the eBOX GPI8. You switch between these two modes of operation with the **Programming / Live Mode** switch located just above the logo.

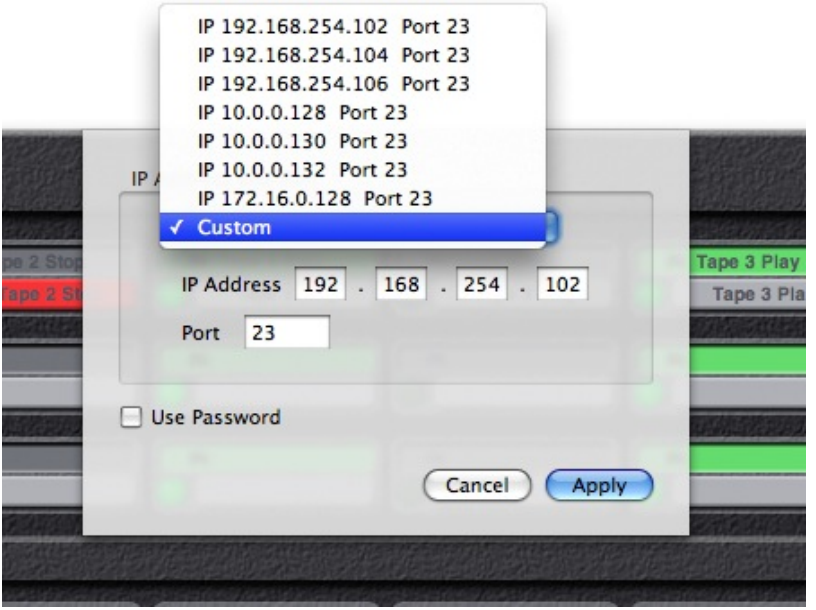


Preferences

The preferences are where you set the IP Address, port and the optional password.

NOTE: The password feature is not currently implemented.

There are several IP Addresses and Ports built in to the eBOX GPI8. They are set using the dip switches on the back of the eBOX GPI8. Refer to the eBOX GPI8 manual for details. You need to set the software to use the same address and port as the hardware. The available ports are listed in the popup menu. With the correct dip switch settings, and by choosing Custom from the popup, you can define your own IP address and port.



Password

If you check the **Use Password** checkbox, you can define an eight character password that will be sent as part of every message to and from the eBOX GPI8. This must match the password set in the eBOX GPI8 hardware. Refer to the eBOX GPI8 manual for setting up the password.



Keysets

This software uses keysets like our control surface software. Different keysets can be set up for different applications, for example, a keyset for Pro Tools and another one for FCP. In Live Mode the eBOX GPI8, software will automatically use the correct keyset for the front application.

To create a new keyset, go to **New Keyset** in the File menu. In the dialog that opens up, navigate to the application that the keyset will be used with, such as Pro Tools, FCP, etc. and click on Open. Use the **Keysets** menu to switch between the various keysets that you have created.





When the eBOX GPI8 Control Center is in the background or not running, the eBOX GPI8 driver checks to see what application is in front then uses the keyset created for that application. If an application has no keyset, then the eBOX GPI8 driver uses a permanent keyset named **Global**. Although the Global keyset can be programmed just like keysets for specific applications, it is probably best to leave it blank. Otherwise, you might start your tape machines playing while browsing in Safari :)

Keysets, and any changes you make to them, are stored automatically in the eBOX GPI8's preference file. There is no need to Save or Open on a regular basis. If you want to make a copy of your work for backup or to move to another Mac, use **Open Archive** and **Save As Archive** in the File menu. These commands store and retrieve all of your keysets in a single file.

Programming Mode



In programming mode, you click on a button, and its information appears in the **Inspector** window. Here, you can give the control a name and a set of actions to perform when it is clicked.

You set up an action in one of the tabs (for example, GPI, MIDI, Special, Delay) then click on **Add Action**. You can keep adding as many actions as you want. They will be performed in order when the button is pressed in **Live Mode**.



Action Tabs

The tabs in the inspector window vary slightly depending on what type of control is selected. All controls will have the MIDI, Special and Delay tabs. GPI Output buttons and GPI Preset buttons will have a GPI Tab, and Serial Port and Serial Preset buttons will have a Serial Tab.



MIDI Tab

The MIDI tab is where you can assign MIDI message to a control. These messages will be received by any running MIDI application that is connected to the eBOX GPI8 Software. The procedure for connecting MIDI applications varies from application to application and will be covered in those applications' manuals.

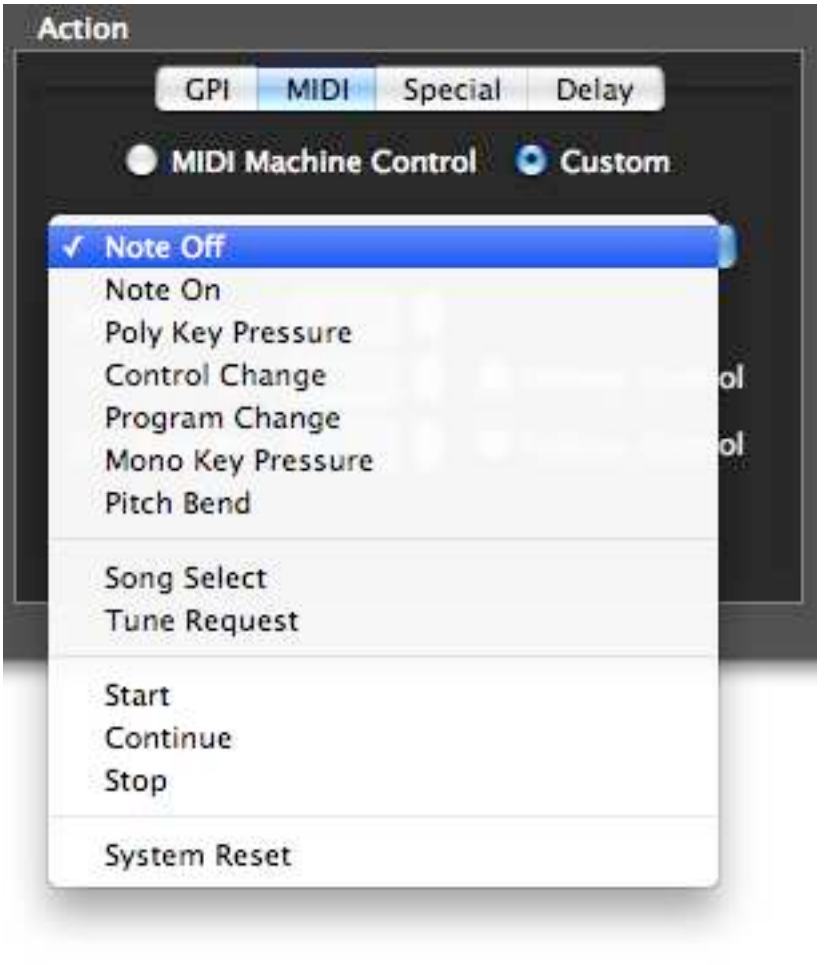
MIDI Machine Control (MMC)

You can assign one of several common MIDI Machine Control (MMC) messages by clicking on the MIDI Machine Control radio button and selecting a message from the popup menu.



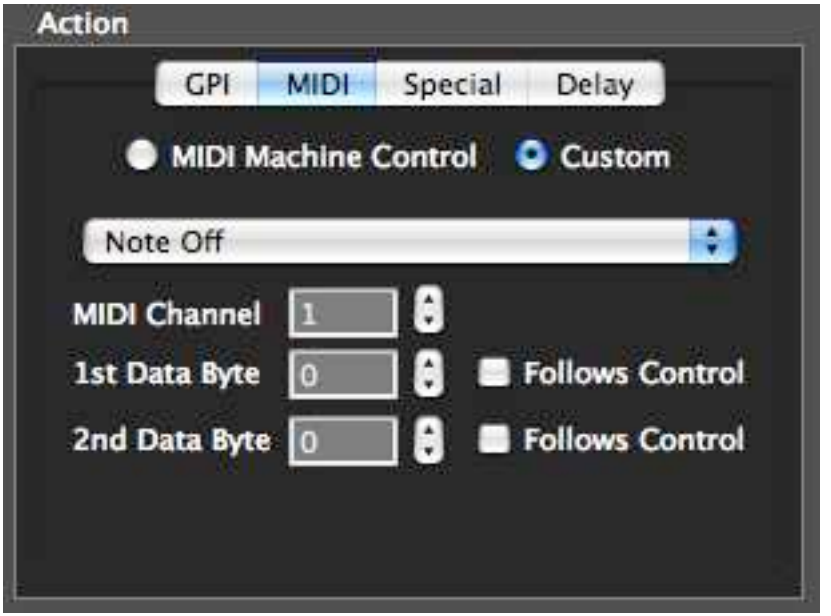
Custom MIDI Messages

By clicking the **Custom** radio button, you can define your own MIDI message. The different message types will appear in a popup menu.



Depending on the type of message you choose, other editing controls will appear. If the message type you have chosen has a channel, you can either type a number from 1 - 16 in the Channel field, or use the up and down arrows next to it. If the message also includes one or two data bytes, the data byte editors will appear. You can type a number from 0-127 or use the up and down arrows. If you check **Follows Control**, then pressing a button in **Live Mode** will cause that data byte to have a value of 7Fhex (127 decimal) and releasing the button will give it a value of 00hex,

In this example, one MMC Command and one Custom MIDI Command have been assigned to a control.



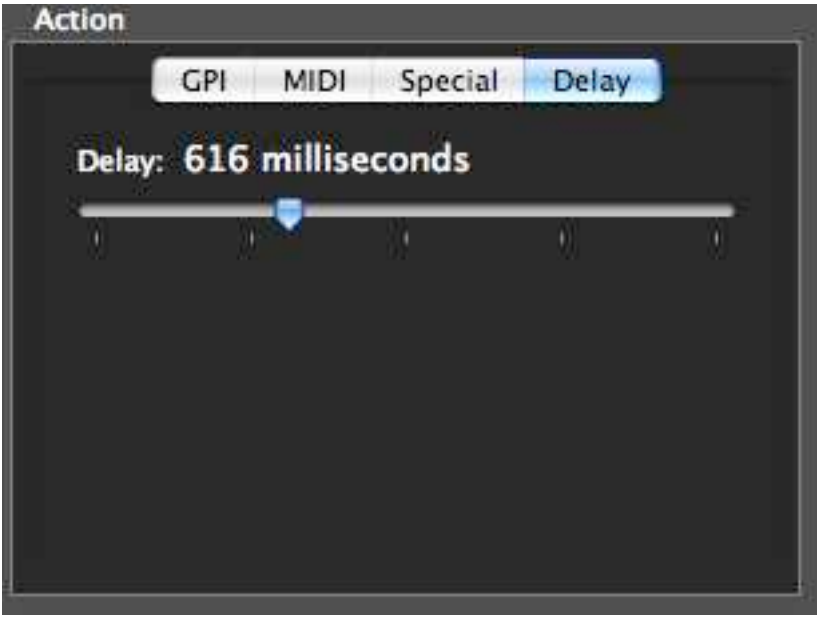
Special Tab

The **Special Tab** is not currently implemented.

Delay Tab

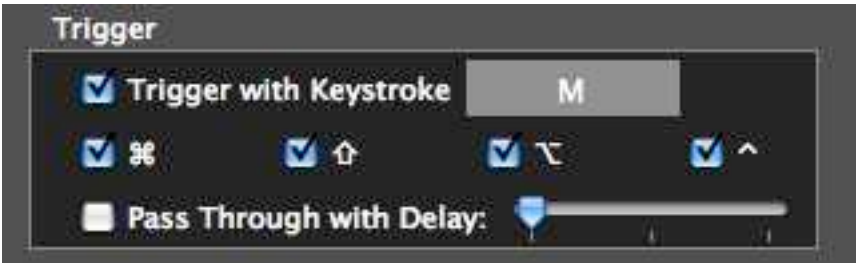
You can use the Delay Tab to set a delay between two actions. Simply move the slider from 0 to 2 seconds then hit the Add/Insert button.

If a GPI Preset button was programmed as in the following example, pressing it in **Live mode** would close some GPI contacts, wait, send a **Record Strobe** to all connected MIDI applications, wait then send another MIDI message.



Keyboard Triggers

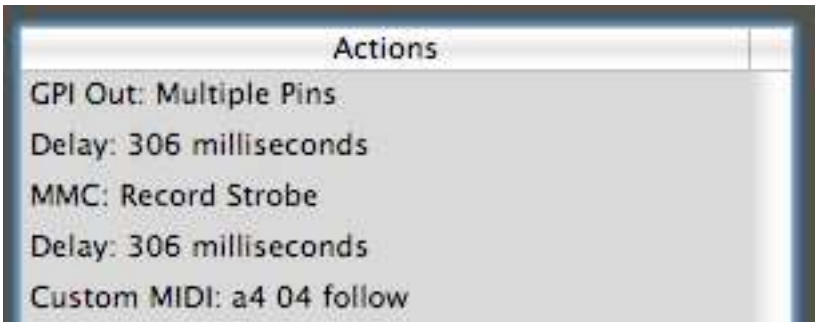
For any buttons that trigger an output (actually, all buttons except for the GPI IN buttons), you can also choose a keyboard trigger that will perform the same actions as clicking on the button. The trigger can optionally be passed on to the front application, with or without a delay. The delay can be from 0 - 1 second. This lets you do things like hit the space bar in Pro Tools to start playback, but have the eBOX GPI8 turn off the studio monitors and wait a half a second before sending the space bar to Pro Tools.



To set a keyboard trigger, click in the field next to **Trigger with Keystroke** then type the trigger Character, modifier keys and all. At any time, you can change the modifier keys by clicking on the modifier checkboxes.

Because the keyboard triggers are assigned to specific applications, they only operate when those apps are in front. Therefore, they will not interfere with Microsoft Word, or your billing software.

*NOTE: Keyboard triggers are disabled in the **Global Keyset** to prevent unwanted interference with other applications.*



All buttons can be either latched or momentary, and you can choose to have them repeat their actions while the button is down.



GPI Input Pins

The top group of buttons each represents Individual GPI pins. There are three rows of input pins and three rows of output pins. For the Input pins, you can program what happens when an individual input pin is changed by some external hardware. Currently the GPI Input pins can generate MIDI Messages and Delays.



GPI Output Pins

Each GPI Output pin button can change the state of its pin, without affecting the other pins. In the GPI tab, you can create a GPI action that closes the contact when the button is pressed and opens it when released. If you click on the **Invert** check box, then it opens the contact on the button press and closes it on release.



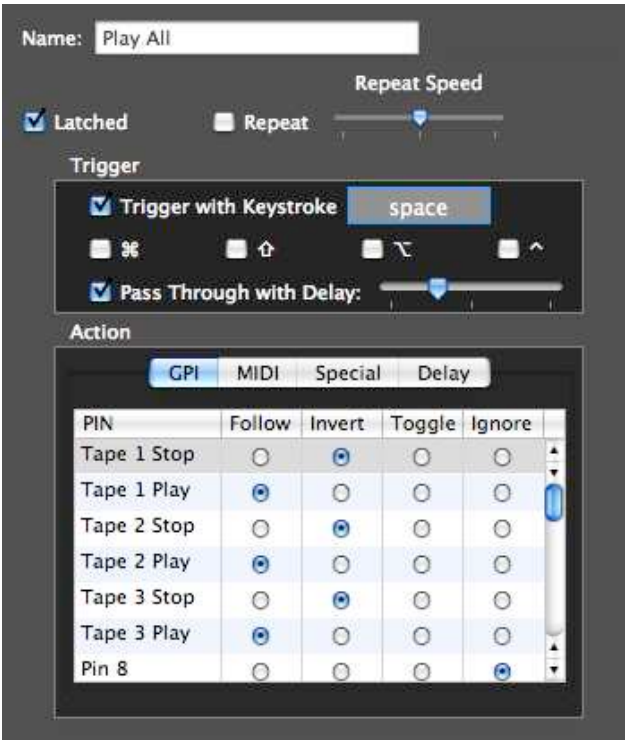
Currently the Special Tab is not implemented. But even without it you have the ability to do something like turn on a contact then delay up to 2 seconds then turn it off again, plus send a MIDI message to an application, and this can be triggered by a keystroke that also does something useful in another program, like Pro Tools.

GPI inputs and outputs are separate entities. They may or may not be connected to the same device. This is why they can be programmed independently. However, when an input and output pin is connected to the same device and you want them both to perform the same actions, you can program the GPI Output pin first, then click on **Apply to GPI In**. This will transfer the output pin's settings to the corresponding input pin.

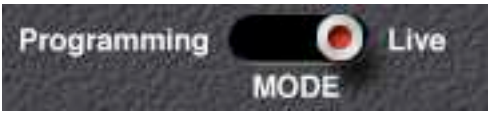


GPI Preset Buttons

The four GPI Preset buttons are similar to the GPI Output buttons, except that they allow you to affect all of the GPI outputs at once. In the GPI tab you can choose for each Pin, whether to have it follow the button state, invert the button state, toggle with each button press, or do nothing.



Live Mode



In live mode, the **Inspector** window is hidden, and the main window's appearance changes slightly.

The **GPI Input Buttons** change to indicators to show the state of the GPI Inputs. They are not clickable since GPI Input actions are only initiated by the external hardware.

In **Live Mode**, the **GPI Output**, **GPI Preset**, **Serial Port** and **Serial Preset** buttons all initiate the actions they were assigned in **Programming** mode.

Activity indicators also appear next to the GPI Output Buttons and the Serial Port Buttons, since there are times when the state of a GPI pin or serial port might be different from the state of the button.



In **Programming** mode, only one button (the one being programmed) can be active at once. In **Live** mode, any button can be active.

When the eBOX GPI8 Control Center is the front application in **Live** mode, you determine which keyset is active using the **Keysets** menu. If the eBOX GPI8 Control Center is in the background, or not running at all, the eBOX GPI8 driver automatically switches keysets based on the front application. If there is no keyset for the frontmost application, then the driver uses the **Global** keyset.

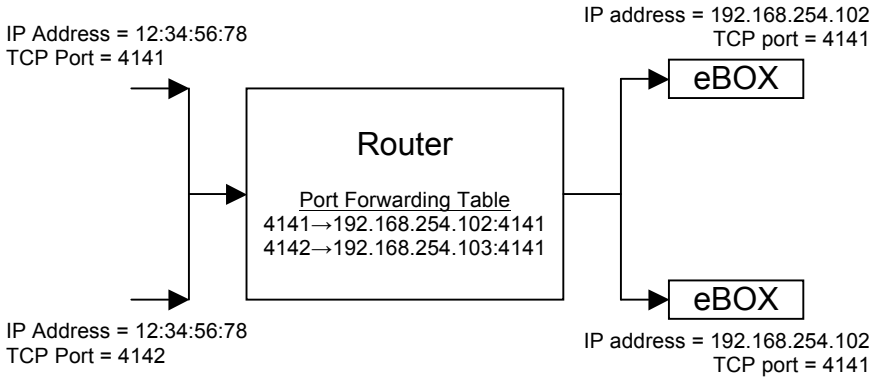
When the eBOX GPI8 Control Center is not the front application, you can use the keyboard triggers you defined in **Programming Mode** to initiate the actions you assigned to the various buttons.

If the eBOX GPI8 Control Center is visible in the background, and in **Live Mode**, then its indicators will still display the states of the **GPI Input** and **Output Pins**.

Using the eBOX GPI8 With a Router

In this section, we will explain how to configure the eBOX GPI8 to work with a router. In this example, we will show how to configure two eBOX GPI8es behind a router. This same information also applies to normal operation of the eBOX GPI8 with different port numbers.

The TCP Port that the eBOX GPI8 uses for configuration is fixed at 4141. However, if the eBOX GPI8 is behind a router and the router is configured to use Port Forwarding to remap the TCP connection the eBOX GPI8, you may have to use a different port. A good example of this is if you have 2 eBOX GPI8es at a remote site. In the example below, there are two eBOX GPI8es behind a router. The router is configured to pass configuration packets coming to the router at IP Address 12.34.56.78, TCP Port 4141 to the first eBOX GPI8 at IP Address 192.168.254.102, TCP Port 4141. Additionally, the router is also configured to pass configuration packets coming to the router at IP Address 12.34.56.78, TCP Port 4142 to the second eBOX GPI8 at IP Address 192.168.254.103, TCP Port 4141.



Technical Reference

Electrical Connections

Ethernet

This eBOX GPI8 port is just like an Ethernet port on a computer, to connect it to a hub, switch or router, use a straight through cable. To connect it to another eBOX GPI8 or computer, use a crossover cable.

The eBOX GPI8 supports IEEE 802.3u clause 28 Auto-Negotiation which automatically senses the Ethernet port speed & duplex operation and chooses the highest performance settings.

In addition, four LEDs on the front panel that indicate various operating conditions of the Ethernet port. These LEDs are:

- Link
- 100BaseT activity
- 10BaseT activity
- Collision

GPI Port Pinouts

The eBOX GPI8 has two connectors for GPI Inputs. One is an orange terminal strip along the top of the rear panel. The other is a 25 pin D-subminiture connector.

The inputs on the terminal strip are optically isolated. The pinout is listed in the following table:

1+	GPI 1 Anode
1-	GPI 1 Cathode
2+	GPI 2 Anode
2-	GPI 2 Cathode
3+	GPI 3 Anode
3-	GPI 3 Cathode
4+	GPI 4 Anode
4-	GPI 4 Cathode
5+	GPI 5 Anode
5-	GPI 5 Cathode
6+	GPI 6 Anode
6-	GPI 6 Cathode
7+	GPI 7 Anode
7-	GPI 7 Cathode
8+	GPI 8 Anode
8-	GPI 8 Cathode

GPI Input Pinout

The eBOX GPI8 has two connectors for GPI Outputs. One is an orange terminal strip along the top of the rear panel. The other is a 25 pin D-subminiture connector.

The outputs on the terminal strip are isolated with dry relay contacts. The pinout is listed in the following table:

1A	GPI 1 Relay
1B	GPI 1 Relay
2A	GPI 2 Relay
2B	GPI 2 Relay
3A	GPI 3 Relay
3B	GPI 3 Relay
4A	GPI 4 Relay
4B	GPI 4 Relay
5A	GPI 5 Relay
5B	GPI 5 Relay
6A	GPI 6 Relay
6B	GPI 6 Relay
7A	GPI 7 Relay
7B	GPI 7 Relay
8A	GPI 8 Relay
8B	GPI 8 Relay

GPI Output Pinout

The GPI ports on the rear of the eBOX GPI8 are 25 pin D-sub connectors. The GPI In connector has 8 TTL/CMOS compatible inputs with internal pull-ups to +5 volts. The GPI Out connector has 8 TTL/CMOS compatible outputs. On both connectors, pin 1 is the ground reference and pins 2-9 are the GPI signals.

When eBOX GPI8es connected together in a client/server manner establish a connection, both client and server eBOX GPI8es will send the state of its GPI In ports to each other so it can be shown on the GPI Out port on the remote eBOX GPI8. After that, changes to a GPI In port will cause an eBOX GPI8 to send a GPI message to the remote eBOX GPI8. Additionally, the eBOX GPI8es will send a GPI message every 5 seconds to keep the connection alive and to refresh the state of the GPI outputs.

A packet is sent whenever a change to the GPI In is sensed. At present, it is sampled about every 20 milliseconds. This can be changed via the configuration web page.

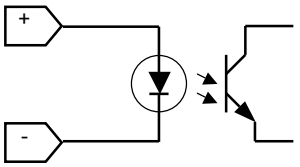
	MSB							LSB
Byte1	Pin 9	Pin 8	Pin 7	Pin 6	Pin 5	Pin 4	Pin 3	Pin 2
Byte2	-	-	-	-	-	-	-	-
Byte3	-	-	-	-	-	-	-	-

eBOX GPI8 GPI In/Out Pinouts

GPI Port Circuitry Details

The eBOX GPI8 GPI input and output circuits are detailed in the following section.

The inputs on the terminal strip are optically isolated.

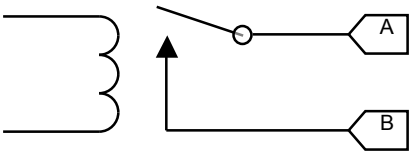


Detail of Optoisolator Input

Recommended Current	16mA
Maximum Current	25mA
Forward Voltage Drop	1.15V
Maximum Reverse Voltage	5.0V

GPI Input Optoisolator Charactersitics

The outputs on the terminal strip are isolated with dry relay contacts.



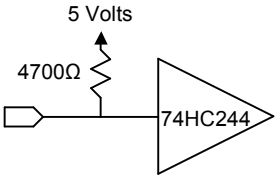
Detail of Relay Output

Maximum Peak Current	500mA
Maximum Peak Break Voltage	200V

GPI Output Relay Charactersitics

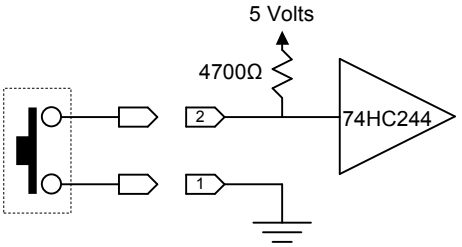
The inputs of the eBOX GPI8 GPI ports on the 25 pin D-subminiture connector are CMOS inputs. The input circuitry has a 4700 ohm pullup resistor to +5 volts as referenced to pin 1 of the GPI Input Port.

Note: Because the inputs are CMOS, the input voltage MUST be limited to voltage levels between 0 and 5 volts. If this is not possible, consider using the eBOX I/O.



Detail of GPI Input

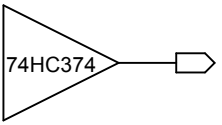
The internal pullup resistor insures that the input pin is set to a known state. The default state of the GPI Inputs is +5 volts or a logic state of '1' in the GPI message bitmap. The internal pullup resistor also allows a simple switch or 'dry contact' to be connected between a GPI Input pin and ground as shown in the example below.



GPI Input Example with Pushbutton Switch

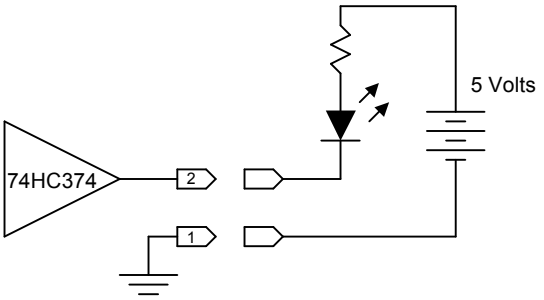
The outputs of the eBOX GPI8 GPI ports on the 25 pin D-subminiture connector are also CMOS. The output signal is referenced to pin 1 of the GPI Output Port. The GPI Outputs are rated to +/- 6mA. If this is not sufficient for your application, consider using the eBOX I/O.

Note: Because the inputs are CMOS, the output voltage MUST be limited to voltage levels between 0 and 5 volts. This can occur if driving a circuit that is powered by a voltage higher than 5 volts. If this is not possible, consider using the eBOX I/O.

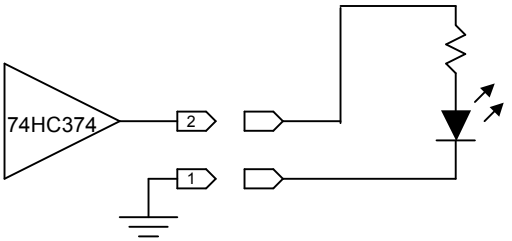


Detail of GPI Output

The example circuits below shows a GPI Output driving an LED.



GPI Output Example #1 with LED



GPI Output Example #2 with LED

Power

The eBOX GPI8 requires a 9 volt DC, center positive power supply capable of delivering at least 500 milliamps. The unit comes with a power supply appropriate for the country in which the unit was sold. If you need a power supply specific to your location, please contact your local distributor or JLCooper Electronics.

Location	JLCooper Part Number
North America	PSDC117
Europe	PSDC230

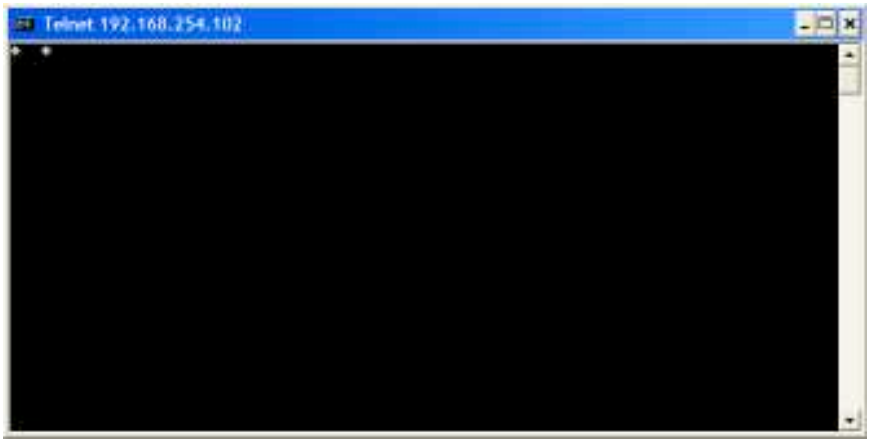
Approved Power Supplies

Warning: Using a power supply other than the units specified in the above table can result in damage to the eBOX GPI8 and/or other equipment which is not covered by the JLCooper Factory Warranty.

Troubleshooting

If for some reason the eBOX GPI8 does not give you the expected results, take a moment to do some investigating. The most important concept is that you have your eBOX GPI8 connected properly as outlined in *Installation and Use*. Take a moment to double check your setup.

- What is the state of the DIP switches?
- Do the 10 red LEDs flash alternately at power up?
- Do the Link and 100 (or 10) LEDs light up?
- In any mode, can you ping it (`ping 192.168.254.102`)?
- If you are using the password protection feature, is it enabled in both eBOX GPI8es?
- In webpage configuration mode, can you communicate with it using the web page?
- In normal client or server mode, can you communicate with it using the eBOX GPI8 Configuration Utility?
- The ARP Cache in the host application may have the incorrect entry for the eBOX GPI8's IP address. Try clearing the ARP cache (`arp -d` in Windows).
- In normal server mode, if you telnet to the eBOX GPI8, do you see a short packet of unprintable characters every 5 seconds as shown in the screenshot below?



If you are using the eBOX GPI8 Configuration Utility, be sure to reboot the eBOX GPI8 for the settings to take effect
A common problem is forgetting to turn the power switch on or turning the unit on after the software application has launched.

In addition, the JLCooper website (www.jlcooper.com) will contain up to date information on drivers, applications and troubleshooting.

If all else fails, you can contact the JLCooper Service Department at: service@jlcooper.com.

Care and Service

If properly cared for, your eBOX GPI8 should provide years of troublefree performance. While the eBOX GPI8 is built in a rugged metal enclosure, please avoid dropping the eBOX GPI8.

Clean with a soft, damp cloth. Do not allow liquids, dust or other foreign matter to get inside the unit.

There are no user-serviceable parts in the eBOX GPI8. Please refer to the JLCooper Electronics Limited Factory Warranty on the last page for detailed warranty and service information.

JLCooper Electronics Limited Warranty

JLCooper Electronics ("JLCooper") warrants this product to be free of defects in materials or workmanship for a period of 12 months from the date of purchase. This warranty is non-transferable and the benefits apply only to the original owner. Proof of purchase in the form of an itemized sales receipt is required for warranty coverage. To receive service under this warranty, customers in the United States should contact the JLCooper factory at (310) 322-9990 and talk to a service technician. If necessary, a Return Authorization number may be issued. For our customers outside the United States, it is recommended that you first contact your Dealer or Distributor, since they may offer their own service or support policy. If local support is not obtainable, please send a FAX to JLCooper's Service Department at +1 310 335 0110 with a detailed description of the service required. Upon issuance of return authorization, the product should be packed in the original shipping materials and shipped prepaid and insured to: Service Department, JLCooper Electronics, 142 Arena Street, El Segundo, CA 90245. Please include the following: copy of the sales receipt, your name and address (no P.O. Boxes, please), a brief description of the problem, and any other related items discussed with the service department and considered necessary to evaluate the product or effect a repair. The return authorization number must be clearly written on the outside of the package. JLCooper will at its option, without charge for parts or labor, either repair or replace the defective part(s) or unit. Carriage, insurance, customs duties, impounds, tariffs, taxes, surchanges, brokerage fees and other shipping costs are not covered by this warranty. JLCooper's normal repair turn around time at the factory is approximately 15 business days from receipt of product to shipping. Your actual turn around time will include return shipping. Actual turn around time will vary depending upon many factors including the repeatability of the customer's reported complaint, the availability of parts required for repair, the availability of related products needed to evaluate the product if necessary. Priority services are available at additional cost. These should be discussed with the service technician at the time the return authorization is issued. This warranty provides only the benefits specified and does not cover defects or repairs needed as result of acts beyond the control of JLCooper including but not limited to: abuse, failure to operate in accordance with the procedures outlined in this owner's manual; nor does it cover damage from accident, negligence, using incorrect power supply, modification, alteration, improper use, unauthorized servicing, tampering, ingress of foreign matter; nor for damage from natural or man-made events such as, but not limited to flooding, lightning, electrostatic discharge, tornadoes, earthquake, fire, civil unrest, war, terrorism, etc.

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