eBOX

Ethernet to Serial & GPI Interface



Users Manual

JLCOOPER ELECTRONICS

eBOX, eBOX GPI8 and eBOX I/O are trademarks of JLCooper Electronics. All other brand names are the property of their respective owners.

eBOX User's Manual, Sixth Edition (March 8, 2016)
Part Number 932095
©2016 JLCooper Electronics, 142 Arena Street, El Segundo, CA 90245 USA
☎ *(310) 322-9990* 🖷 *(310) 335-0110* 💻 *www.jlcooper.com*

Table of Contents

Introduction **5**

Setup **6**

Unpacking *6*

Connections *6*

Operating Modes **7**

Web Page Configuration 7

eBOX Server Mode 7

eBOX Client Mode 8

GPI to Serial Conversion 8

GPI to Ethernet Conversion 8

Resetting eBOX Settings **9**

Initial Hardware Configuration **10**

eBOX Configuration Utility **11**

eBOX to Configure *12*

eBOX Password Change *12*

eBOX Settings *13*

Configuration with Web Page Interface **14**

Operational Settings 16

eBOX IP Address 18

Port **19**

GPI Functions in GPI Conversion Modes **20**

GPI Inputs 20

GPI Outputs 21

GPI Programmer Software **22**

eBOX GPI Tester Utility **25**

eBOX Software for Apple Mac **28**

Installation *28*

Operation *29*

Preferences *29*

Password *29*
Keysets *29*
Programming Mode *31*
Action Tabs *32*
MIDI Tab *33*
MIDI Machine Control (MMC) 33
Custom MIDI Messages 34
Special Tab *35*
Delay Tab *35*
Keyboard Triggers *36*
GPI Input Pins *37*
GPI Output Pins *37*
GPI Preset Buttons *39*
Serial Port Buttons *40*
Serial Preset Buttons *41*
Live Mode *42*
Using the eBOX With a Router 44
Using with eBOX I/O 45
Technical Reference 46
Electrical Connections *46*
Ethernet 46
Serial 47
GPI Port Pinouts 49
GPI Port Circuitry Details 50
Power 52
Troubleshooting 53
Care and Service *54*
JLCooper Electronics Limited Warranty 55

Introduction

The eBOX is a general purpose interface box that converts 4 serial communication ports and 24 GPI (General Purpose Interface) inputs and outputs to 100/10baseT Ethernet. The serial ports can be configured as EIA/TIA RS-232E (CCITT V.28) or as EIA/TIA RS-422A ports. This can be performed easily in the field. Additionally, the port direction can be configured as DTE or DCE on each port independently.

The eBOX 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 can also be connected to other eBOXes to allow longer runs than traditional serial and GPI cables. Since the eBOX uses TCP/IP, traffic can be routed over internal LANs, wireless LANs, MANs, WANs and even over the public Internet.

Most configuration can be accomplished through a web page server built into the eBOX. Items such as port speed, parity, IP address, remote IP address and TCP port are set using a standard web browser. Settings are stored in nonvolatile memory.

Typically, the eBOX functions as a server, passively waiting for client devices to connect to it. The device can be a computer or another eBOX configured as a client. When the eBOX is configured as a client, it will actively attempt to connect to the server eBOX. Once this is accomplished, the either eBOX will pass data received in the serial or GPI ports to the remote eBOX. If there is no data received in the eBOX, the eBOX will not send any TCP packets.

In addition, the eBOX can operate as a GPI to Serial Converter or GPI to Ethernet Converter. In these modes, the eBOX will convert GPI input triggers to deck commands.

Setup

Unpacking

The eBOX package will contain the following items:

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

Connections

The eBOX connections are straightforward:

1. Plug the power supply into the eBOX.
2. Plug a network cable into the Ethernet jack.
3. Connect serial cables into ports 1-4.
4. Connect GPI cables into GPI ports.

Operating Modes

The eBOX 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 must be power cycled for the changes to take effect.

SW8	SW7	SW5	
On	X	Off	Web Page Configuration
Off	Off	Off	eBOX is server at address specified on next page
Off	On	Off	eBOX is client at address specified on next page
Off	On	On	eBOX performs GPI to serial conversion
Off	Off	On	eBOX performs GPI to Ethernet conversion

X = Don't Care

Mode Configuration

Web Page Configuration

When DIP switch 8 is set to the 'On' position, the eBOX starts up in the Web Page Configuration Mode. This allows the user to configure the settings of the eBOX with a web browser such as Internet Explorer 6. More information can be found in the section *'Configuration with Webpage Interface'*. The web page can be found at the IP address set by DIP Switches 1, 2 and 3.

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

eBOX Server Mode

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

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

eBOX Client Mode

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

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

GPI to Serial Conversion

When the eBOX is in GPI to Serial Conversion Mode, it converts GPI inputs into serial messages out to the four serial ports. The IP address of the eBOX is set by DIP switches 1, 2 and 3 plus one. The TCP port is fixed at 8000. The GPI Programmer Software allows you to edit and upload the commands that are sent when GPI inputs are triggered.

When the eBOX operates as a GPI to Serial Converter, it will send to the to Serial Port A status requests on a periodic basis. Replies from the deck 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 later in this manual.

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

GPI to Ethernet Conversion

When the eBOX 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 is set by DIP switches 1, 2 and 3 plus one. The TCP port is fixed at 8000. The eBOX GPI Programmer Software allows you to edit and upload the commands that are sent when GPI inputs are triggered.

When the eBOX 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 must be power cycled to switch to this mode.

Resetting eBOX Settings

The eBOX 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 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 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*
Serial Port Rate	38400 bits/sec
Parity	Odd
Serial Port Timeout	5 mS
Maximum Buffer Size	128 bytes

eBOX Settings After Reset

After the eBOX settings are reset in this manner, you must power cycle the eBOX 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.

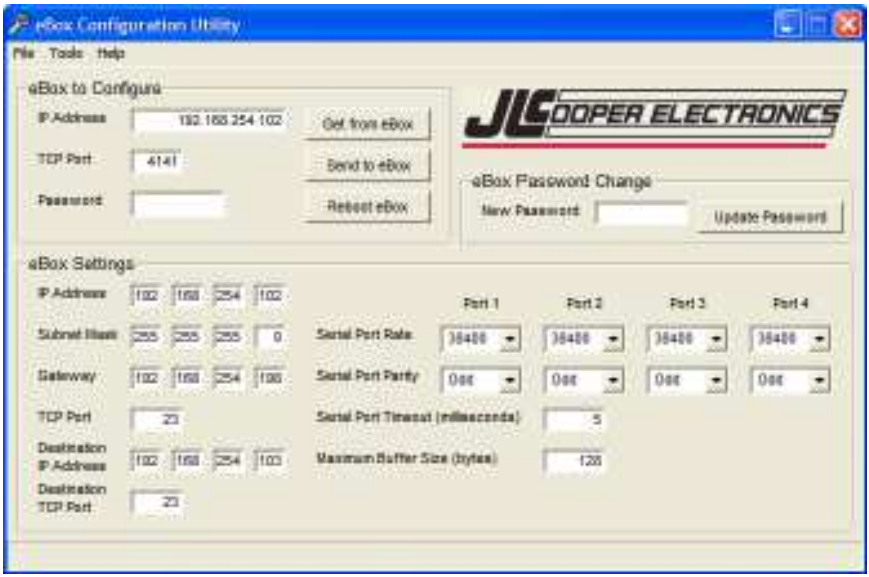
SW3	SW2	SW1	SW7	Mode	IP Address
Off	Off	Off	Off	Server	192.168.254.102
Off	Off	Off	On	Client	192.168.254.103
Off	Off	On	Off	Server	192.168.254.104
Off	Off	On	On	Client	192.168.254.105
Off	On	Off	Off	Server	192.168.254.106
Off	On	Off	On	Client	192.168.254.107
Off	On	On	Off	Server	10.0.0.128
Off	On	On	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

eBOX Configuration Utility

Beginning with version 1.09 firmware, a second TCP connection was added. This allows the eBOX to be configured while the eBOX is in use and avoids any compatibility issues with web browsers. This is the recommended way to configure the eBOX.

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



To use the utility, simply install and launch it.

eBOX to Configure

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

IP Address

This is IP Address of the target eBOX to configure.

TCP Port

This is the TCP Port of the target eBOX 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 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 uses a password to prevent unauthorized access. The default password is '*password*'.

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

eBOX Password Change

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

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

eBOX Settings

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

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

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

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

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

Baud Rate
Sets the port speed of the individual serial ports.

Parity and Parity Type
Enables or disables parity and sets parity type of the serial ports.

Serial Time Out
Sets the time that the eBOX will wait for data from the serial ports.

Max Buff Size
Sets the maximum buffer size of the serial ports.

Configuration with Web Page Interface

Note: Beginning with version 1.09 firmware, the ability to configure the eBOX with the eBOX Configuration Utility while the eBOX is in use was added. For this reason, using the eBOX Configuration Utility to configure the eBOX is the recommended method to configure the eBOX.

When SW8 is set in the 'On' position, the eBOX 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 will not send Serial/GPI messages when the eBOX is set to configuration mode.

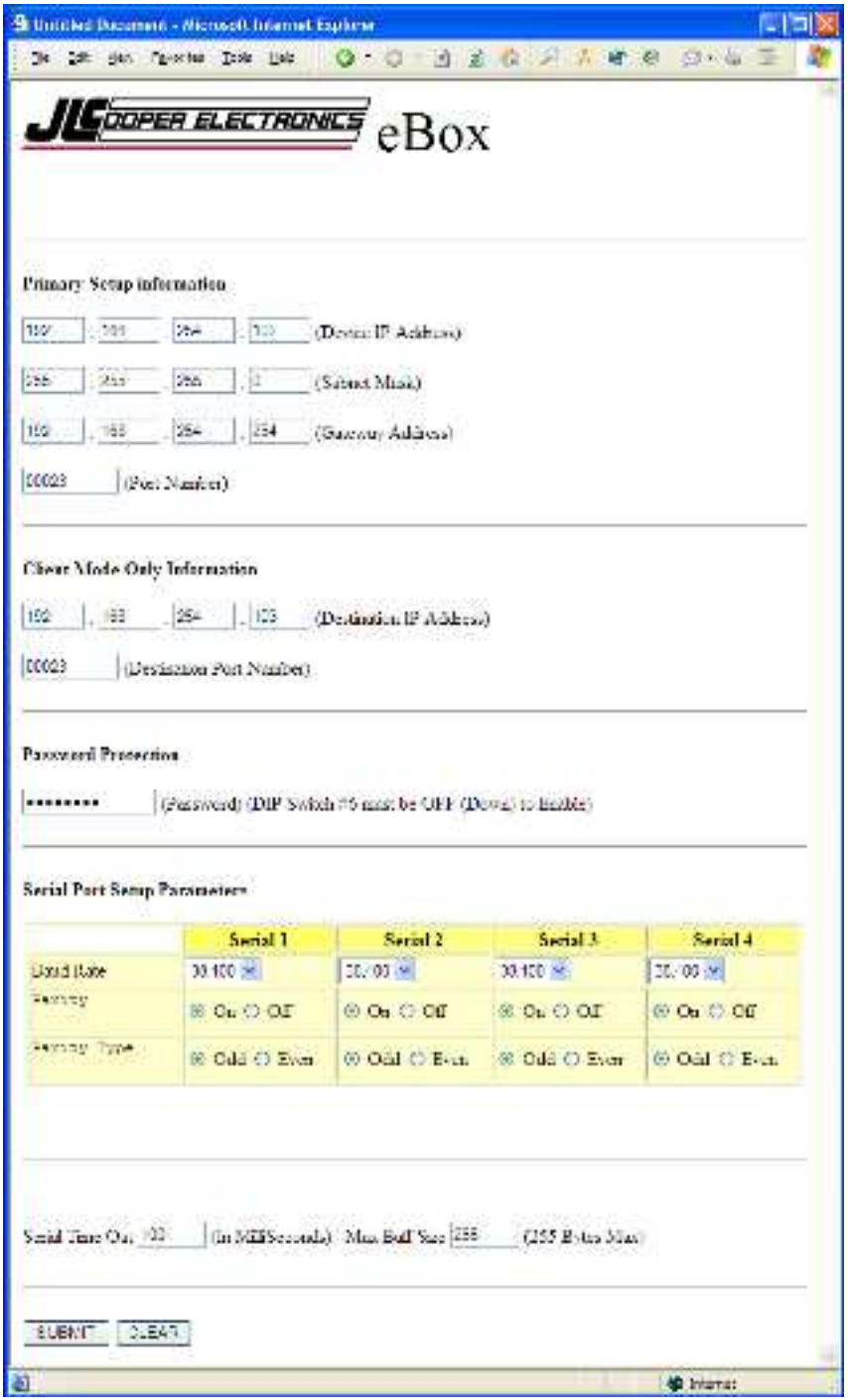
This page is accessed by setting SW8 to the 'On' position and typing http://192.168.254.102 into your web browser. During this time, the normal operation of the eBOX is suspended. Make any changes that are necessary for your system and click on SUBMIT. These changes are stored in nonvolatile memory and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

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

The configuration web page is shown on the next page.


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 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 when SW1, SW2 and SW3=On.

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

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

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

Baud Rate
Sets the port speed of the individual serial ports.

Parity and Parity Type
Enables or disables parity and sets parity type of the serial ports.

Serial Time Out
Sets the time that the eBOX will wait for data from the serial ports.

Max Buff Size
Sets the maximum buffer size of the serial ports.

eBOX Security

The eBOX contains a basic security mechanism that prevents unintended hosts or eBOXes from passing data through a secured eBOX. An eBOX 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 embeds the password in the transmitted IP packet. At the remote end, the receiving eBOX must have password protection enabled AND have a matching password.

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

This security mechanism is only used in eBOX Server and eBOX Client modes. SW6 should be set to the off position when used in the GPI to Serial and 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 has password protection is disabled, it will ignore the password and act on any packets sent to it.

eBOX IP Address

The IP address of the eBOX 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 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 Server and eBOX 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 Server and eBOX Client modes

Here is a table of how IP address and the TCP port are set with the DIP switches in eBOX GPI to Serial and 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

eBOX Message Concatenation Correction

Note: This feature is only availiable in v2.04 or later firmware.

As eBOX messages pass over a network, it is possible that multiple message packets can get combined into a single message packet. This is called concatenation. The eBOX has the ability to gracefully detect this situation and correctly separate and decode the messages.
In certain cases, the mechanism which handles eBOX messages that get concatenated into a single TCP packet could inadvertently decode serial data as an eBOX header. This could prevent the unit from successfully decoding the messages.
To avoid this, this feature can be disabled by setting DIP switch 4 to the ‘up’ position.

SW4	
On	Disable Concatenation Correction
Off	Enable Concatenation Correction

Concatenation Correction Configuration

GPI Functions in GPI Conversion Modes

GPI Inputs

Here are the default GPI to serial mappings for the eBox GPI Inputs.

1 - Ground
2 - 20 00 20 Stop
3 - 20 01 21 Play
4 - 20 20 40 Rewind
5 - 20 10 30 Fast Forward
6 - 20 02 22 Record
7 - 42 30 40 00 B2 Arm Insert
8 - 42 30 00 00 72 disarm all tracks
9 - 42 30 10 00 82 Video
10 - 42 30 11 00 83 Arm Video, A1
11 - 42 30 13 00 85 Arm Video, A1, A2
12 - 42 30 13 01 86 Arm Video, A1, A2, DA1
13 - 42 30 13 03 88 Arm Video, A1, A2, DA1, DA2
14 - 42 30 13 07 8C Arm Video, A1, A2, DA1, DA2, DA3
15 - 42 30 00 0F 94 Arm Video, A1, A2, DA1, DA2, DA3, DA4
16 - 20 65 85 Edit On
17 - 20 64 84 Edit Off
18 - 20 61 81 Full EE On
19 - 20 60 80 Full EE Off
20 - 20 00 20 Stop
21 - 20 00 20 Stop
22 - Port 1 Disable/Enable
23 - Port 2 Disable/Enable
24 - Port 3 Disable/Enable
25 - Port 4 Disable/Enable

GPI Outputs

When the eBOX operates as a GPI to Serial or GPI to Ethernet Converter, it will send to the Doremi server or to Serial Port A 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:

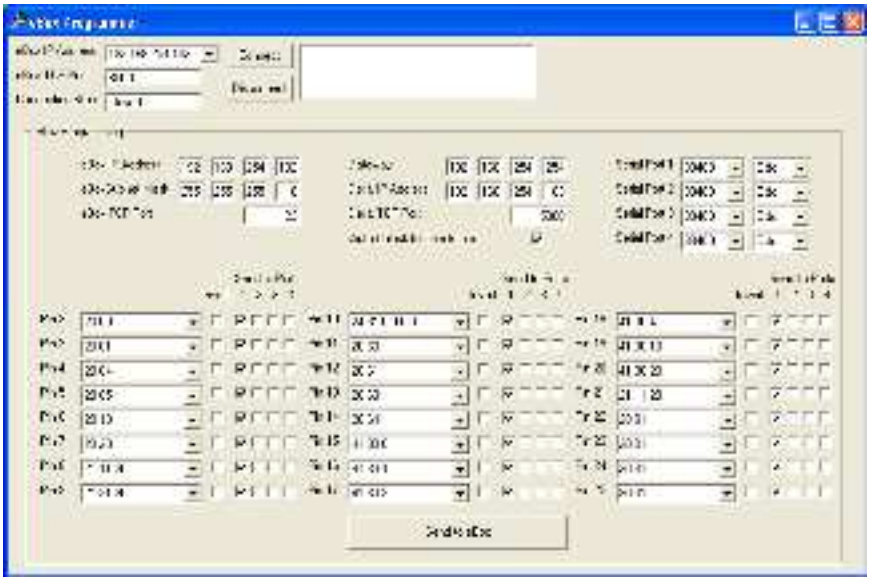
Pin	Tally Function	Pin	Tally Function
1	Ground	14	Jog
2	Play	15	Shuttle
3	Record	16	-
4	Fast Forward	17	Servo Lock
5	Rewind	18	A1
6	-	19	A2
7	Stop	20	TC
8	-	21	-
9	Standby	22	Video
10	Cue Up	23	Assemble
11	Still	24	Insert
12	Forward Direction	25	-
13	Varispeed		

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 GPI Programmer Software.

GPI Programmer Software

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



eBOX IP address

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

eBOX TCP Port

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

Connection State

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

Connect / Disconnect

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

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

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

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

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

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 when SW1, SW2 and SW3=On.

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

Destination Port Number
TCP port of remote eBOX when SW1, SW2 and SW3=On. This is used when eBOX is configured in the GPI to Ethernet mode or the eBOX 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 in applications that do not involve a VTR.

Serial Ports Baud Rate
Sets the port rate of the individual serial ports.

Serial Ports Parity / Type
Enables or disables parity and sets parity type of the individual serial ports.

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 allows you to specify which serial port(s) the commands are sent.

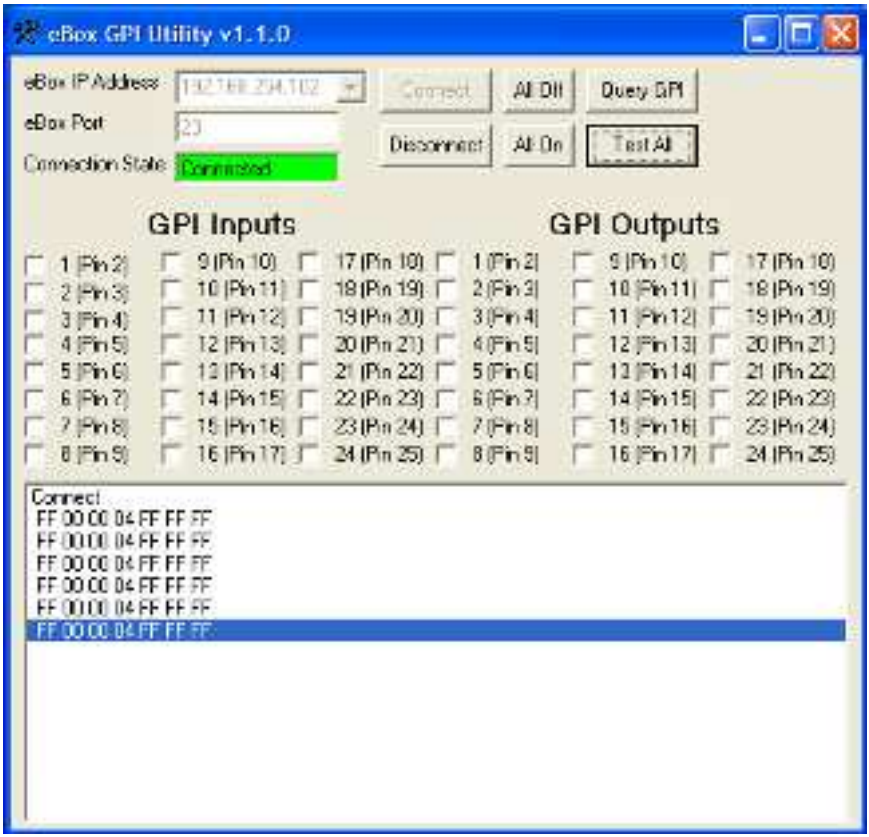
Send to eBOX
Clicking this button downloads all the parameters to the eBOX. During the download, the eBOX will momentarily stop responding to GPI inputs. This is normal. The serial messages and serial port routings will be effective immediately. However, changes to the IP settings and serial port settings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

eBOX GPI Tester Utility

The GPI Tester Utility pictured below allows you to perform basic tests with your eBOX, 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. The GPI Tester Utility can be used to connect to an eBOX configured for server mode.

The GPI Tester Utility can not connect to an eBOX:

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



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

eBOX TCP Port
This is the TCP port of the eBOX you want to test. The eBOX 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 you want to test.

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

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

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

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

eBOX Software for Apple Mac

Installation

The installer puts the folder **eBox** in the /Applications folder. This folder contains the **eBox Control Center** application and the **eBox Uninstaller**. The installer also places **eBox_StartupItem** in /Library/StartupItems and **eBoxMidiDriver** in /Library/MIDI Drivers.

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

*NOTE: Currently the uninstaller is unable to remove the **eBox Control Center** application.*



Operation

After restart run eBox 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. You switch between these two modes of operation with the **Programming / Live Mode** switch located just above the logo.



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. This must match the password set in the eBox hardware. Refer to the eBox 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, 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 Control Center is in the background or not running, the eBox 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 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'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

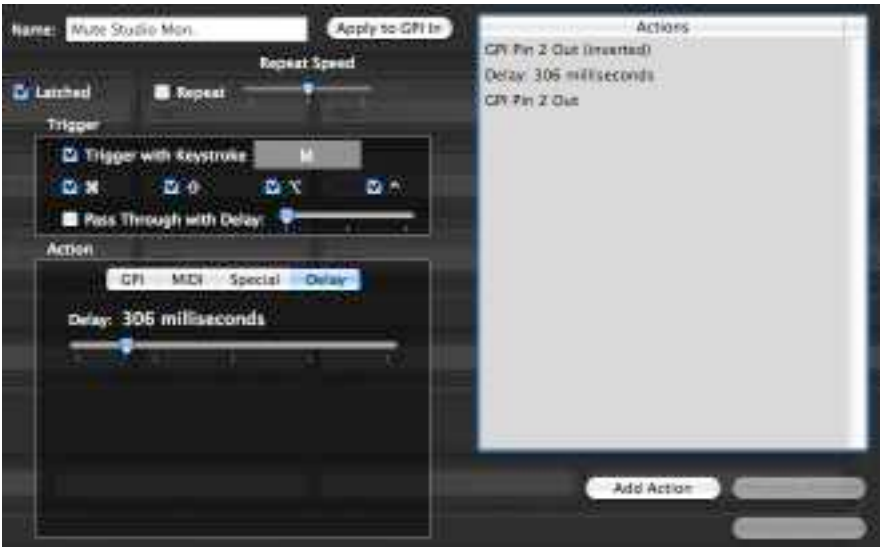


In programming mode, you click on a button, and its information appears in the **Inspector** window. Here, you can give the control a name and a set of actions to perform when it is clicked.

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 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.

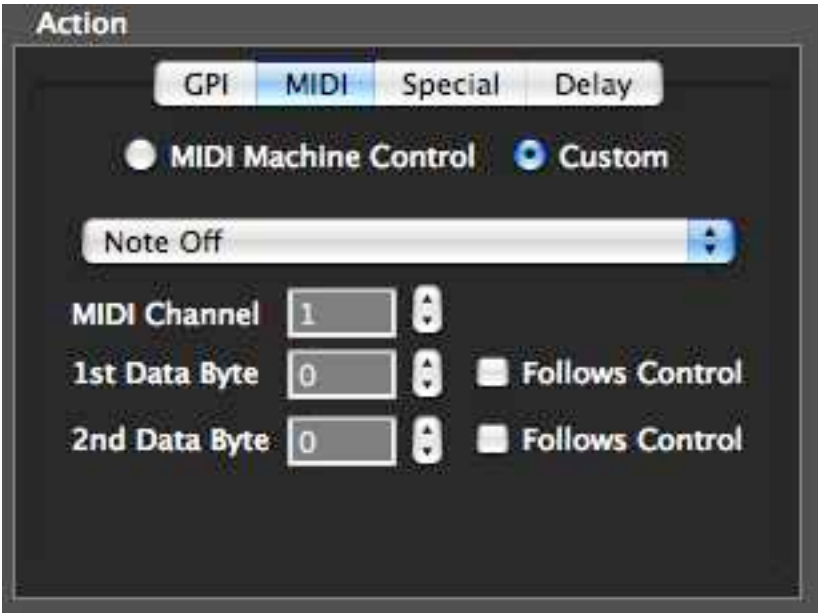


Custom MIDI Messages

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.

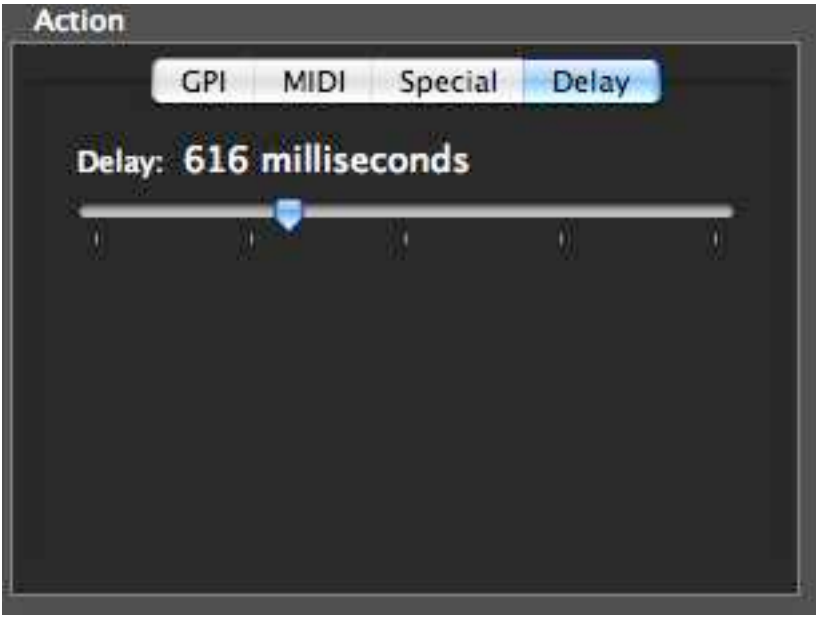


Special Tab

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 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.



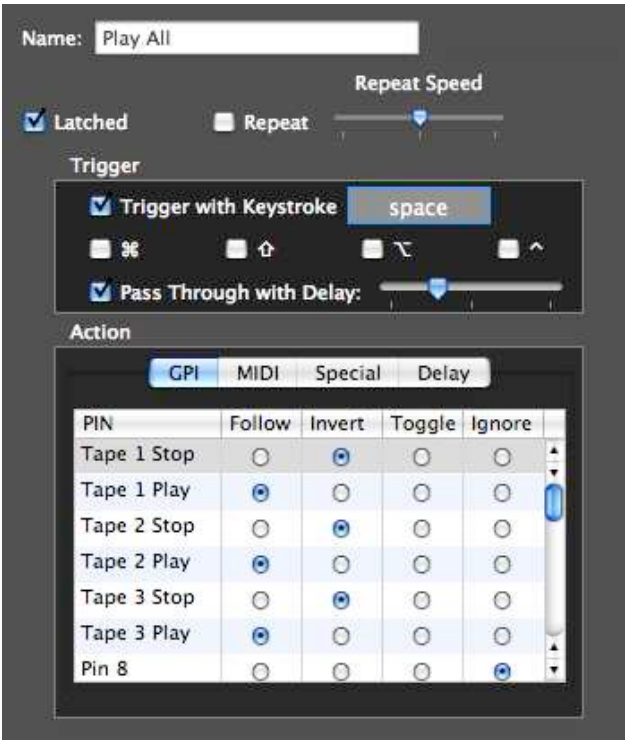
Currently the Special Tab is not implemented. But even without it you have the ability to do something like turn on a contact then delay up to 2 seconds then turn it off again, plus send a MIDI message to an application, and this can be triggered by a keystroke that also does something useful in another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

Unlike serial ports, where the input and output signals are carried over the same cable, and are usually going to the same device, 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.



Serial Port Buttons

Each of the four Serial Port buttons lets you send a message to a serial port. It can be a Sony 9-Pin serial command, or any arbitrary string that you can type in. The serial message can be combined with MIDI and Delay actions. The Special tab is not currently implemented.

The custom messages can be entered and displayed in either decimal, hex or ASCII notation. The notation style is chosen with the radio buttons at the bottom of the window.

Since the **Serial Port** buttons only send one command, they are most useful if you have a single command that you send to a port frequently. They are also useful displaying the name of the device the port is connected to.



Serial Preset Buttons

The **Serial Preset** buttons are more flexible. There are four banks, each bank containing five F-Keys and five transport buttons. There are four **Gang** buttons above each bank. These buttons let you direct the bank's output to one or more serial ports.



While more than one of the five F-Keys can be active at once, the transport buttons act like "radio" buttons. That is, only one can be active at once. Sorry, you can't Record in Rewind. It's a feature. If that's actually a problem, let us know.



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. The exception is the **Serial Preset Transport Controls**. Within each preset bank, each transport control is mutually exclusive.

When the eBox Control Center is the front application in **Live** mode, you determine which keyset is active using the **Keysets** menu. If the eBox Control Center is in the background, or not running at all, the eBox 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.

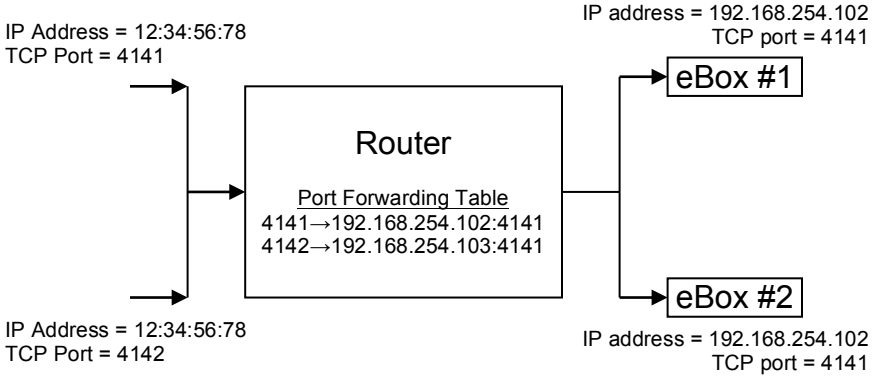
When the eBox Control Center is not the front application, you can use the keyboard triggers you defined in **Programming Mode** to initiate the actions you assigned to the various buttons.

If the eBox 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** and the **Serial Port Inputs**.

Using the eBOX With a Router

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

The TCP Port that the eBOX uses for configuration is fixed at 4141. However, if the eBOX is behind a router and the router is configured to use Port Forwarding to remap the TCP connection the eBOX, you may have to use a different port. A good example of this is if you have 2 eBOXes at a remote site. In the example below, there are two eBOXes 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 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 at IP Address 192.168.254.103, TCP Port 4141.



Using with eBOX I/O

The eBOX GPI inputs and outputs are CMOS compatible circuits. The CMOS GPI inputs require that the input signals be 0 to 5 volts and referenced to ground. The CMOS GPI outputs can deliver 0 to 5 volts at up to +/- 6mA and referenced to ground.

In many cases, this will be compatible with your equipment. However, in some cases, there will be the end user equipment may not be compatible with 0 to 5 volt requirements of the eBOX GPI inputs and outputs. In this case, the eBOX I/O must be used. Each eBOX I/O buffers 8 inputs and 8 outputs. The inputs are buffered with an optoisolators while the outputs are buffered with a dry relay contact. Up to three eBOX I/Os can be used with a single eBOX.



Technical Reference

Electrical Connections

Ethernet

This eBOX 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 or computer, use a crossover cable.

The eBOX 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

Serial

The four serial ports along the top of the rear panel are 9 pin D-Sub connectors which can be configured for RS-232C or RS-422A operation. In RS-422 mode, the eBOX direction can be configured to appear as a Controller or a Device. In RS-232 mode, the eBOX appears as a DCE or DTE.

Mode	RS-232C	RS-232C	RS-422A	RS-422A
Direction	To Device	To Computer	To Deck	To Controller
Left SW	Out	In	Out	In
Right SW	In	In	Out	Out
Pin 1	not used	not used	not used	not used
Pin 2	Receive	Transmit	Receive A	Transmit A
Pin 3	Transmit	Receive	Transmit B	Receive B
Pin 4	not used	not used	Ground	Ground
Pin 5	Ground	Ground	Ground	Ground
Pin 6	not used	not used	Ground	Ground
Pin 7	not used	not used	Receive B	Transmit B
Pin 8	not used	not used	Transmit A	Receive A
Pin 9	not used	not used	not used	not used

Serial Port Configuration

Older versions of the eBOX used DIP switches to configure the mode of the ports. In RS-232 mode, the RS-422 ICs must be removed. These ICs are marked 89C22.

Mode	RS-232C	RS-422A	RS-422A
Direction	To Computer	To Deck	To Controller
SW1	On	Off	Off
SW2	X	On	Off
Pin 1	not used	not used	not used
Pin 2	Transmit	Receive A	Transmit A
Pin 3	Receive	Transmit B	Receive B
Pin 4	not used	Ground	Ground
Pin 5	Ground	Ground	Ground
Pin 6	not used	Ground	Ground
Pin 7	not used	Receive B	Transmit B
Pin 8	not used	Transmit A	Receive A
Pin 9	not used	not used	not used

X = Don't Care

Serial Port Configuration

GPI Port Pinouts

The GPI ports on the rear of the eBOX are 25 pin D-sub connectors. The GPI In connector has 24 TTL/CMOS compatible inputs with internal pull-ups to +5 volts. The GPI Out connector has 24 TTL/CMOS compatible outputs. On both connectors, pin 1 is the ground reference and pins 2-25 are the GPI signals.

When eBOXes connected together in a client/server manner establish a connection, both client and server eBOXes 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. After that, changes to a GPI In port will cause an eBOX to send a GPI message to the remote eBOX. Additionally, the eBOXes 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	Pin 17	Pin 16	Pin 15	Pin 14	Pin 13	Pin 12	Pin 11	Pin 10
Byte3	Pin 25	Pin 24	Pin 23	Pin 22	Pin 21	Pin 20	Pin 19	Pin 18

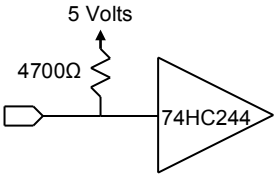
eBOX GPI In/Out Pinouts

GPI Port Circuitry Details

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

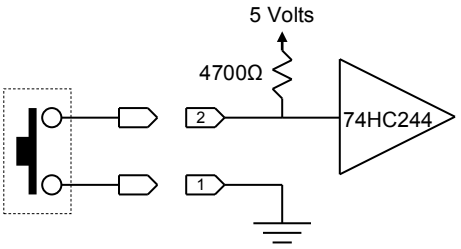
The inputs of the eBOX GPI ports are CMOS inputs. The input circuitry has a 4700 ohm pullup resistor to +5 volts as referenced to pin 1 of the GPI Input Port.

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

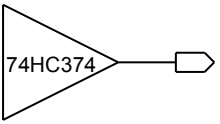
The internal pullup resistor insures that the input pin is set to a known state. The default state of the GPI Inputs is +5 volts or a logic state of '1' in the GPI message bitmap. The internal pullup resistor also allows a simple switch or 'dry contact' to be connected between a GPI Input pin and ground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



GPI Input Example with Pushbutton Switch

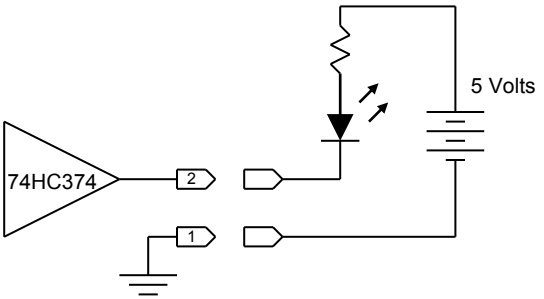
The outputs of the eBOX GPI ports are also CMOS. The output signal is referenced to pin 1 of the GPI Output Port. The GPI Outputs are rated to +/- 6mA. If this is not sufficient for your application, consider using the eBOX I/O.

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.

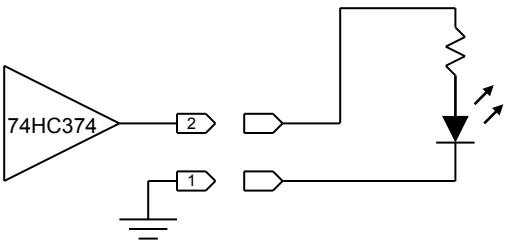


Detail of GPI Output

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 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

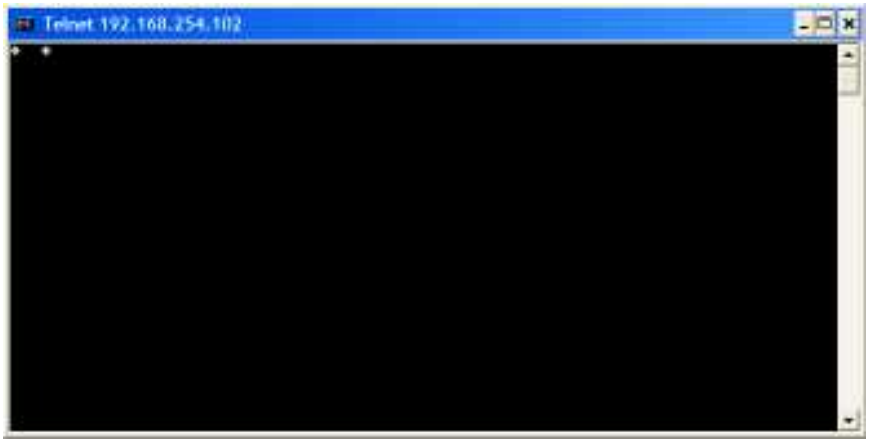
Approved Power Supplies

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

Troubleshooting

If for some reason the eBOX does not give you the expected results, take a moment to do some investigating. The most important concept is that you have your eBOX 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 eBOXes?
- 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 Configuration Utility?
- The ARP Cache in the host application may have the incorrect entry for the eBOX's IP address. Try clearing the ARP cache (`arp -d` in Windows).
- In normal server mode, if you telnet to the eBOX, do you see a short packet of unprintable characters every 5 seconds as shown in the screenshot below?



If you are using the eBOX Configuration Utility, be sure to reboot the eBOX 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 should provide years of troublefree performance. While the eBOX is built in a rugged metal enclosure, please avoid dropping the eBOX.

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. 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.

THE DURATION OF ANY OTHER WARRANTIES, WHETHER IMPLIED OR EXPRESS, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTY OF MERCHANTABILITY, IS LIMITED TO THE DURATION OF THE EXPRESS WARRANTY HEREIN. JLCOOPER HEREBY EXCLUDES INCIDENTAL AND CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO: LOSS OF TIME, INCONVENIENCE, DELAY IN PERFORMANCE OF THIS WARRANTY, THE LOSS OF USE OF THE PRODUCT OR COMMERCIAL LOSS, AND FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY OF MERCHANT-ABILITY APPLICABLE TO THIS PRODUCT. JLCOOPER SHALL NOT BE LIABLE FOR DAMAGES OR LOSS RESULTING FROM THE NEGLIGENT OR INTENTIONAL ACTS OF THE SHIPPER OR HIS CONTRACT AFFILIATES. THE CUSTOMER SHOULD CONTACT THE SHIPPER FOR PROPER CLAIMS PROCEDURES IN THE EVENT OF DAMAGE OR LOSS RESULTING FROM SHIPMENT. THIS WARRANTY SHALL BE GOVERENED BY THE LAWS OF THE STATE OF CALIFORNIA.