eBOX
Ethernet to Serial & GPI Interface

Users Manual
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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 it to 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.

<table>
<thead>
<tr>
<th>SW8</th>
<th>SW7</th>
<th>SW5</th>
<th>Mode Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>X</td>
<td>Off</td>
<td>Web Page Configuration</td>
</tr>
<tr>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>eBOX is server at address specified on next page</td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>Off</td>
<td>eBOX is client at address specified on next page</td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>On</td>
<td>eBOX performs GPI to serial conversion</td>
</tr>
<tr>
<td>Off</td>
<td>Off</td>
<td>On</td>
<td>eBOX performs GPI to Ethernet conversion</td>
</tr>
</tbody>
</table>

X = Don’t Care

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.

![eBOX Interface Diagram](image)

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:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP Address</td>
<td>192.168.254.102</td>
</tr>
<tr>
<td>Subnet Mask</td>
<td>255.255.255.0</td>
</tr>
<tr>
<td>Gateway Address</td>
<td>192.168.254.198</td>
</tr>
<tr>
<td>TCP Port</td>
<td>23</td>
</tr>
<tr>
<td>Destination IP Address</td>
<td>192.168.254.103</td>
</tr>
<tr>
<td>Destination TCP Port</td>
<td>5000</td>
</tr>
<tr>
<td>Password</td>
<td>password</td>
</tr>
<tr>
<td>Serial Port Rate</td>
<td>38400 bits/sec</td>
</tr>
<tr>
<td>Parity</td>
<td>Odd</td>
</tr>
<tr>
<td>Serial Port Timeout</td>
<td>5 mS</td>
</tr>
<tr>
<td>Maximum Buffer Size</td>
<td>128 bytes</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>SW3</th>
<th>SW2</th>
<th>SW1</th>
<th>SW7</th>
<th>Mode</th>
<th>IP Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>Server</td>
</tr>
<tr>
<td>192.168.254.102</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>On</td>
<td>On</td>
<td>Client</td>
</tr>
<tr>
<td>192.168.254.103</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off</td>
<td>Off</td>
<td>On</td>
<td>Off</td>
<td>Off</td>
<td>Server</td>
</tr>
<tr>
<td>192.168.254.104</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>Off</td>
<td>Off</td>
<td>On</td>
<td>Client</td>
</tr>
<tr>
<td>192.168.254.105</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>Off</td>
<td>On</td>
<td>Off</td>
<td>Server</td>
</tr>
<tr>
<td>192.168.254.106</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>On</td>
<td>On</td>
<td>On</td>
<td>Client</td>
</tr>
<tr>
<td>10.0.0.128</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>Server</td>
</tr>
<tr>
<td>10.0.0.129</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On</td>
<td>Off</td>
<td>Off</td>
<td>On</td>
<td>On</td>
<td>Client</td>
</tr>
<tr>
<td>10.0.0.130</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>On</td>
<td>Server</td>
</tr>
<tr>
<td>10.0.0.131</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On</td>
<td>Off</td>
<td>On</td>
<td>Off</td>
<td>Off</td>
<td>Server</td>
</tr>
<tr>
<td>10.0.0.132</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On</td>
<td>Off</td>
<td>On</td>
<td>On</td>
<td>On</td>
<td>Client</td>
</tr>
<tr>
<td>10.0.0.133</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On</td>
<td>On</td>
<td>Off</td>
<td>Off</td>
<td>On</td>
<td>Server</td>
</tr>
<tr>
<td>172.16.0.128</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On</td>
<td>On</td>
<td>Off</td>
<td>On</td>
<td>On</td>
<td>Client</td>
</tr>
<tr>
<td>172.16.0.129</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On</td>
<td>On</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>Server</td>
</tr>
<tr>
<td>Set by user, Default=192.168.254.102</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On</td>
<td>On</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>Server</td>
</tr>
<tr>
<td>Set by user, Default=192.168.254.102</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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](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.
Primary Setup information

192.168.254.102 (Device IP Address)
255.255.255.0 (Subnet Mask)
192.168.254.254 (Gateway Address)
00023 (Port Number)

Client Mode Only Information

192.168.254.103 (Destination IP Address)
00023 (Destination Port Number)

Password Protection

********** (Password) (DIP Switch #6 must be OFF (Down) to Enable)

Serial Port Setup Parameters

<table>
<thead>
<tr>
<th></th>
<th>Serial 1</th>
<th>Serial 2</th>
<th>Serial 3</th>
<th>Serial 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Band Rate</td>
<td>38.400</td>
<td>38.400</td>
<td>38.400</td>
<td>38.400</td>
</tr>
<tr>
<td>Parity</td>
<td>On</td>
<td>On</td>
<td>On</td>
<td>On</td>
</tr>
<tr>
<td>Parity Type</td>
<td>Odd</td>
<td>Odd</td>
<td>Odd</td>
<td>Odd</td>
</tr>
</tbody>
</table>

Serial Time Out | 100 | (In MilliSeconds) | Max Buff Size | 255 | (255 Bytes Max) |
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.

<table>
<thead>
<tr>
<th>SW6</th>
<th>Disable password protection</th>
<th>Enable password protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>SW3</th>
<th>SW2</th>
<th>SW1</th>
<th>SW7</th>
<th>Mode</th>
<th>IP Address</th>
<th>Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>Server</td>
<td>192.168.254.102</td>
<td>23</td>
</tr>
<tr>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>On</td>
<td>Client</td>
<td>192.168.254.103</td>
<td>23</td>
</tr>
<tr>
<td>Off</td>
<td>Off</td>
<td>On</td>
<td>Off</td>
<td>Server</td>
<td>192.168.254.104</td>
<td>23</td>
</tr>
<tr>
<td>Off</td>
<td>Off</td>
<td>On</td>
<td>On</td>
<td>Client</td>
<td>192.168.254.105</td>
<td>23</td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>Off</td>
<td>Off</td>
<td>Server</td>
<td>192.168.254.106</td>
<td>23</td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>Off</td>
<td>On</td>
<td>Client</td>
<td>192.168.254.107</td>
<td>23</td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>On</td>
<td>Off</td>
<td>Server</td>
<td>10.0.0.128</td>
<td>23</td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>On</td>
<td>On</td>
<td>Client</td>
<td>10.0.0.129</td>
<td>23</td>
</tr>
<tr>
<td>On</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>Server</td>
<td>10.0.0.130</td>
<td>23</td>
</tr>
<tr>
<td>On</td>
<td>Off</td>
<td>Off</td>
<td>On</td>
<td>Client</td>
<td>10.0.0.131</td>
<td>23</td>
</tr>
<tr>
<td>On</td>
<td>Off</td>
<td>On</td>
<td>Off</td>
<td>Server</td>
<td>10.0.0.132</td>
<td>23</td>
</tr>
<tr>
<td>On</td>
<td>Off</td>
<td>On</td>
<td>On</td>
<td>Client</td>
<td>10.0.0.133</td>
<td>23</td>
</tr>
<tr>
<td>On</td>
<td>On</td>
<td>Off</td>
<td>Off</td>
<td>Server</td>
<td>172.16.0.128</td>
<td>23</td>
</tr>
<tr>
<td>On</td>
<td>On</td>
<td>Off</td>
<td>On</td>
<td>Client</td>
<td>172.16.0.129</td>
<td>23</td>
</tr>
<tr>
<td>On</td>
<td>On</td>
<td>On</td>
<td>Off</td>
<td>Server</td>
<td>Set by user</td>
<td></td>
</tr>
<tr>
<td>On</td>
<td>On</td>
<td>On</td>
<td>On</td>
<td>Client</td>
<td>Set by user</td>
<td></td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>SW3</th>
<th>SW2</th>
<th>SW1</th>
<th>IP Address</th>
<th>Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>192.168.254.103</td>
<td>8000</td>
</tr>
<tr>
<td>Off</td>
<td>Off</td>
<td>On</td>
<td>192.168.254.105</td>
<td>8000</td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>Off</td>
<td>192.168.254.107</td>
<td>8000</td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>On</td>
<td>10.0.0.129</td>
<td>8000</td>
</tr>
<tr>
<td>On</td>
<td>Off</td>
<td>Off</td>
<td>10.0.0.131</td>
<td>8000</td>
</tr>
<tr>
<td>On</td>
<td>Off</td>
<td>On</td>
<td>10.0.0.133</td>
<td>8000</td>
</tr>
<tr>
<td>On</td>
<td>On</td>
<td>Off</td>
<td>172.16.0.129</td>
<td>8000</td>
</tr>
<tr>
<td>On</td>
<td>On</td>
<td>On</td>
<td>Set by user</td>
<td>8000</td>
</tr>
</tbody>
</table>

IP Address Configuration in GPI conversion modes

**eBOX Message Concatenation Correction**

*Note: This feature is only available 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.

<table>
<thead>
<tr>
<th>SW4</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>Disable Concatenation Correction</td>
</tr>
<tr>
<td>Off</td>
<td>Enable Concatenation Correction</td>
</tr>
</tbody>
</table>

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:

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

**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.

![GPI Tester Utility Interface](image)

The GPI Tester Utility interface shows the connection state and the GPI inputs and outputs. The screen displays the current configuration and allows you to test different pins for connectivity.

- **Connect** button: Connects to the eBOX.
- **All Off** button: Turns off all GPI pins.
- **Query GPI** button: Queries the GPI status.
- **Test All** button: Tests all GPI pins simultaneously.

The interface also shows the current IP address and port configuration, allowing for easy setup and troubleshooting.
**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.*
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.

![Image of Open dialog]

Use the **Keysets** menu to switch between the various keysets that you have created.

![Image of eBox Control Center Keysets menu]

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.

![Custom MIDI Message Popup Menu](image-url)
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.

![Delay Tab Image]

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.

![Actions Image]
**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.

![Image of Trigger settings](image)

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.

<table>
<thead>
<tr>
<th>Mode</th>
<th>RS-232C</th>
<th>RS-232C</th>
<th>RS-422A</th>
<th>RS-422A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction</td>
<td>To Device</td>
<td>To Computer</td>
<td>To Deck</td>
<td>To Controller</td>
</tr>
<tr>
<td>Left SW</td>
<td>Out</td>
<td>In</td>
<td>Out</td>
<td>In</td>
</tr>
<tr>
<td>Right SW</td>
<td>In</td>
<td>In</td>
<td>Out</td>
<td>Out</td>
</tr>
<tr>
<td>Pin 1</td>
<td>not used</td>
<td>not used</td>
<td>not used</td>
<td>not used</td>
</tr>
<tr>
<td>Pin 2</td>
<td>Receive</td>
<td>Transmit</td>
<td>Receive A</td>
<td>Transmit A</td>
</tr>
<tr>
<td>Pin 3</td>
<td>Transmit</td>
<td>Receive</td>
<td>Transmit B</td>
<td>Receive B</td>
</tr>
<tr>
<td>Pin 4</td>
<td>not used</td>
<td>not used</td>
<td>Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>Pin 5</td>
<td>Ground</td>
<td>Ground</td>
<td>Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>Pin 6</td>
<td>not used</td>
<td>not used</td>
<td>Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>Pin 7</td>
<td>not used</td>
<td>not used</td>
<td>Receive B</td>
<td>Transmit B</td>
</tr>
<tr>
<td>Pin 8</td>
<td>not used</td>
<td>not used</td>
<td>Transmit A</td>
<td>Receive A</td>
</tr>
<tr>
<td>Pin 9</td>
<td>not used</td>
<td>not used</td>
<td>not used</td>
<td>not used</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Mode</th>
<th>RS-232C</th>
<th>RS-422A</th>
<th>RS-422A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Direction</strong></td>
<td>To Computer</td>
<td>To Deck</td>
<td>To Controller</td>
</tr>
<tr>
<td>SW1</td>
<td>On</td>
<td>Off</td>
<td>Off</td>
</tr>
<tr>
<td>SW2</td>
<td>X</td>
<td>On</td>
<td>Off</td>
</tr>
<tr>
<td>Pin 1</td>
<td>not used</td>
<td>not used</td>
<td>not used</td>
</tr>
<tr>
<td>Pin 2</td>
<td>Transmit</td>
<td>Receive A</td>
<td>Transmit A</td>
</tr>
<tr>
<td>Pin 3</td>
<td>Receive</td>
<td>Transmit B</td>
<td>Receive B</td>
</tr>
<tr>
<td>Pin 4</td>
<td>not used</td>
<td>Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>Pin 5</td>
<td>Ground</td>
<td>Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>Pin 6</td>
<td>not used</td>
<td>Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>Pin 7</td>
<td>not used</td>
<td>Receive B</td>
<td>Transmit B</td>
</tr>
<tr>
<td>Pin 8</td>
<td>not used</td>
<td>Transmit A</td>
<td>Receive A</td>
</tr>
<tr>
<td>Pin 9</td>
<td>not used</td>
<td>not used</td>
<td>not used</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Byte1</th>
<th>Pin 9</th>
<th>Pin 8</th>
<th>Pin 7</th>
<th>Pin 6</th>
<th>Pin 5</th>
<th>Pin 4</th>
<th>Pin 3</th>
<th>Pin 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Byte2</td>
<td>Pin 17</td>
<td>Pin 16</td>
<td>Pin 15</td>
<td>Pin 14</td>
<td>Pin 13</td>
<td>Pin 12</td>
<td>Pin 11</td>
<td>Pin 10</td>
</tr>
<tr>
<td>Byte3</td>
<td>Pin 25</td>
<td>Pin 24</td>
<td>Pin 23</td>
<td>Pin 22</td>
<td>Pin 21</td>
<td>Pin 20</td>
<td>Pin 19</td>
<td>Pin 18</td>
</tr>
</tbody>
</table>

**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.

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.
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.*

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

![GPI Output Example #1 with LED](image1)

![GPI Output Example #2 with LED](image2)
# 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.

<table>
<thead>
<tr>
<th>Location</th>
<th>JLCooper Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>PSDC117</td>
</tr>
<tr>
<td>Europe</td>
<td>PSDC230</td>
</tr>
</tbody>
</table>

**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, surcharges, 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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