Matrix Switch Corporation
MSC-GCP2U32
Product Manual

2RU Remote Panel with LCD interface

Revision 1.2

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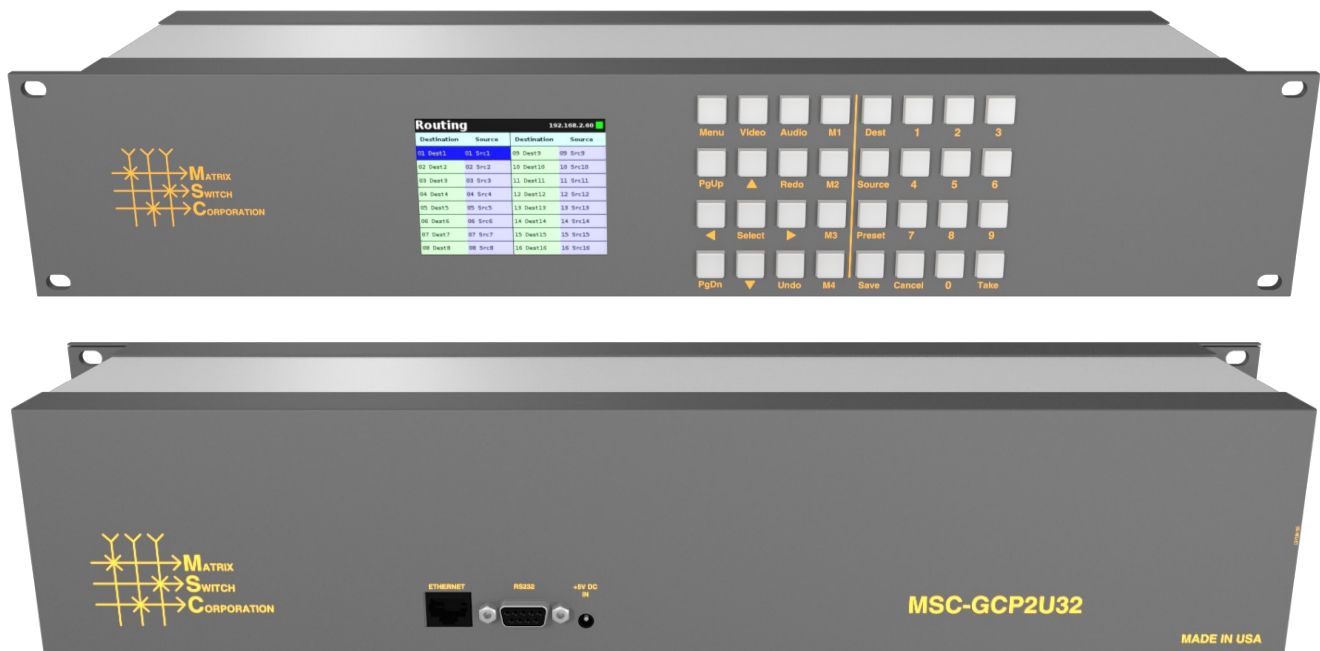
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Revision 1.0 2013-04-15	• Initial release of modular product manual.

Table of Contents

1 Getting Started

Congratulations on your purchase of a quality Matrix Switch Corporation product. This section contains a general overview of device functionality and provides information to get you up and running quickly. Additional sections in this manual can be consulted for more detailed information on the subsystems and features of this product.

1.1 Device Connections

The **MSC-GCP2U32** comes with a power supply adapter and a documentation CD. Additional cables and hardware are not usually provided.

- **Power supply adapter** – A 5 Volt 2 Amp power supply adapter is provided which is connected to the 3.4mm OD 1.3mm ID coaxial connector on the device and plugged into a 100-240V 50/60Hz AC power source.
- **Ethernet connector** – Connect to a network switch with an Ethernet cable. Required for controlling a remote router, accessing the web page interface and using the TCP/IP Mascot interface. A crossover cable can also be utilized for connecting directly to a computer (for configuration purposes) or the router to control.
- **RS-232 Serial (Optional)** – If serial control is desired, using the Mascot Protocol, connect a D9 female to female straight through cable to a control system, such as a computer. Use 115200 bps 8N1 as the serial configuration and enable local echo to see typed characters.

1.2 Powering Up The Device

This device is not equipped with a power switch and is simply connected to the power supply adapter which is plugged into a suitable AC power source, to power it up.

Once the device is powered it goes through the following startup sequence:

- u-boot bootloader starts up (accessible via serial port by pressing a key in a serial console when prompted to), which can be used for system recovery and failsafe startup (refer to the Failsafe boot instructions section for details).
- LCD panel is initialized and displays the Matrix Switch Corporation logo.
- LCD button interface is initialized and routing page is displayed.
- The panel will initialize the matrix profile assigned with the DefaultProfile Command and attempt to connect to the router(s) it references. The M1-M4 buttons will flash until the matrix profile has been refreshed (successfully connected to all router(s)). If the panel is the master of the routing state, then preset 0 is recalled.

1.3 Front Panel LCD Interface

This panel is equipped with an LCD interface which can be used for many configuration, control and status display functions. Refer to the LCD User Interface section for detailed operating instructions.

1.4 Web Page Interface

All Matrix Switch Corporation router and panel devices come with a built-in web page interface.

NOTE: The MSC-GCP2U32 LCD panel acts as a router proxy and offers many of the same control interfaces as a router. Refer to the Virtual Routing section for more details.

Devices come factory configured with default settings, unless a pre-configuration request is made during purchase, an example being a multi device application.

1.4.1 Accessing The Web Page Interface

The default network IP address for this device is 192.168.2.80. Refer to the table below for the default IP addresses for other types of Matrix Switch Corporation devices.

Device Type	Default IP Address
Video/Audio Routers	192.168.2.60
Remote Button Panels	192.168.2.64
Remote LCD Screen Panels	192.168.2.80

To access the web page interface of the device:

1. Connect the Ethernet port of a computer either directly to the device using a crossover cable or to the same Ethernet network through a network switch or other LAN infrastructure.
2. Manually configure the computer's IP address to be a **unique** address on the same IP subnet as the device. For example 192.168.2.10. The Netmask should be 255.255.255.0. The Gateway doesn't matter for this purpose, but could be set to 192.168.2.1.
3. Make sure the device is powered on.
4. Using a web browser on the computer, enter the device's IP address into the Location bar and press ENTER. The web page interface should load. If the web page interface fails to load, double check the computer's network settings and physical Ethernet connections. In the event that the IP address of the device is unknown, refer to the Unknown IP Address troubleshooting section.

1.4.2 Network Settings

Network settings can be changed on the Config tab of the Web Page Interface. This includes DHCP enable, IP address, Netmask and Gateway settings. DHCP should only be used for assigning specific network settings from a central DHCP server or when assigned IP addresses can be determined, otherwise configuring the device via its IP address would be prevented if the IP address is unknown. After changing network settings, click the Save button and then click the Reboot button to restart the device. Refer to the Config Tab - Network Settings section for more details.

In the event that the device's IP address is unknown, refer to the Unknown IP Address troubleshooting section.

Refer to the Network Planning section for assistance with developing a network plan for multi-device applications.

1.4.3 Matrix Routing

The Routing tab of the Web Page Interface provides a convenient way to view and change the matrix routing state and is the default page shown.

A preset can also be recalled from this interface, by selecting one from the Load Preset drop down control.

Refer to the [Routing Tab](#) section for more details.

1.4.4 Labels

Labels can be assigned to video (and audio if applicable) sources and destinations. Labels can also be assigned to presets. Labels can be up to 8 characters in length. The default source labels use "Src" as a prefix, and the destination labels use "Dest" as a prefix (example: Src1). The presets are labeled "Startup" for Preset 0 and "PresetN", where N is a number from 1 to 9, for the remaining presets.

The Labels Tab on the Web Page Interface can be used for modifying labels. Click the Save button to store any changes that are made. Refer the [Labels Tab](#) section for more details.

1.4.5 Presets

There are 10 stored matrix routing presets. Preset 0 is recalled on power up and by default routes source 1 to all destinations. All other presets default to "No Change" for all destinations, which when recalled will have no effect. Presets can assign a partial subset of destinations or all destinations as desired.

Presets can be modified on the Presets Tab of the Web Page Interface. Refer to the [Presets Tab](#) section for more details.

1.4.6 Panel Remote Router IP Address

Remote panels control Matrix Switch Corporation video/audio routers with the TCP/IP protocol via the Ethernet port.

NOTE: The MSC-GCP2U32 LCD panel offers advanced Virtual Routing capabilities and has the ability to control multiple routers via profiles. Refer to the [Virtual Routing](#) section for more details.

The **Remote Router IP** setting on the Config Tab of the Web Page Interface defines the IP address of the remote router which the panel interface will control. This defaults to 192.168.2.60 on remote panels, which is the default IP address of Matrix Switch Corporation routers.

After changing the **Remote Router IP** setting click the **Save** button to store the changes, which take effect immediately (a reboot is not required).

Refer to the [Config Tab - Button Panel Settings](#) section for more details on configuring the Remote Router IP Address.

Refer to the [Network Planning](#) section for more details on configuring devices in multi-device applications.

1.5 Network Planning

The default device settings can be used without change in applications with a single router and optionally one remote panel on the same Ethernet network. Larger installations or integration with existing IP LAN networks require some network planning.

NOTE: Matrix Switch Corporation can assist in planning and pre-configuring devices for specific application requirements at purchase time. Just ask a sales or customer service representative.

Manual IP address management is recommended, although a DHCP server can be a convenient option for centrally managing IP addresses by device MAC address, the net effect still being a fixed IP for each device. Consult your DHCP server documentation for information on assigning IP addresses by MAC address, if this

option is chosen.

All devices which need to communicate with one another (routers, remote panels and computers) need to be physically connected to the same LAN or allow IP packet routing between networks if on separate LANs.

SECURITY WARNING: Matrix Switch Corporation devices are meant for installation in trusted LAN environments. In the event that remote device configuration or control is desired over public networks or the Internet, it is strongly recommended that some form of inter-network security is utilized, such as firewalls and encrypted VLAN or secure data tunnels. This is necessary to prevent undesired access to devices.

Devices on the same LAN need to be assigned unique IP addresses in the same IP subnet. Matrix Switch Corporation devices are configured by default to use IP addresses in the class C IP subnet 192.168.2.x. When integrating devices into an existing LAN network, unique IP addresses should be assigned from the applicable network and the Netmask setting of the devices should be set to reflect the class (size) of the IP network (the default of 255.255.255.0 is for class C, which accommodates up to 254 addresses).

The Gateway setting is required to be set to the IP address of the network gateway on remote panels which will be accessing routers across network subnets, but this setting is otherwise not needed.

After assigning device network settings, including unique IP addresses, remote panels need to be assigned the correct IP addresses to their **Remote Router IP** setting of the router they will control.

Additional configuration changes may be required, depending on the application and are described in subsequent sections.

1.5.1 Installation Example

The following diagram is of a simple installation example consisting of a 32x32 SDI Video Router, with a secondary level 32x32 Analog Audio router connected via the AFV DB-25 interface, a 32x32 Remote Button Panel, a 2RU LCD Remote Panel and a Computer system.

32x32 Remote Button Panel
IP: 192.168.2.64

SDI 32x32 Video Router
IP: 192.168.2.60

Ethernet Network Switch

DB-25 Cable

Computer
IP: 192.168.2.10

32x32 Analog Audio Router

2RU LCD Remote Panel
IP: 192.168.2.80
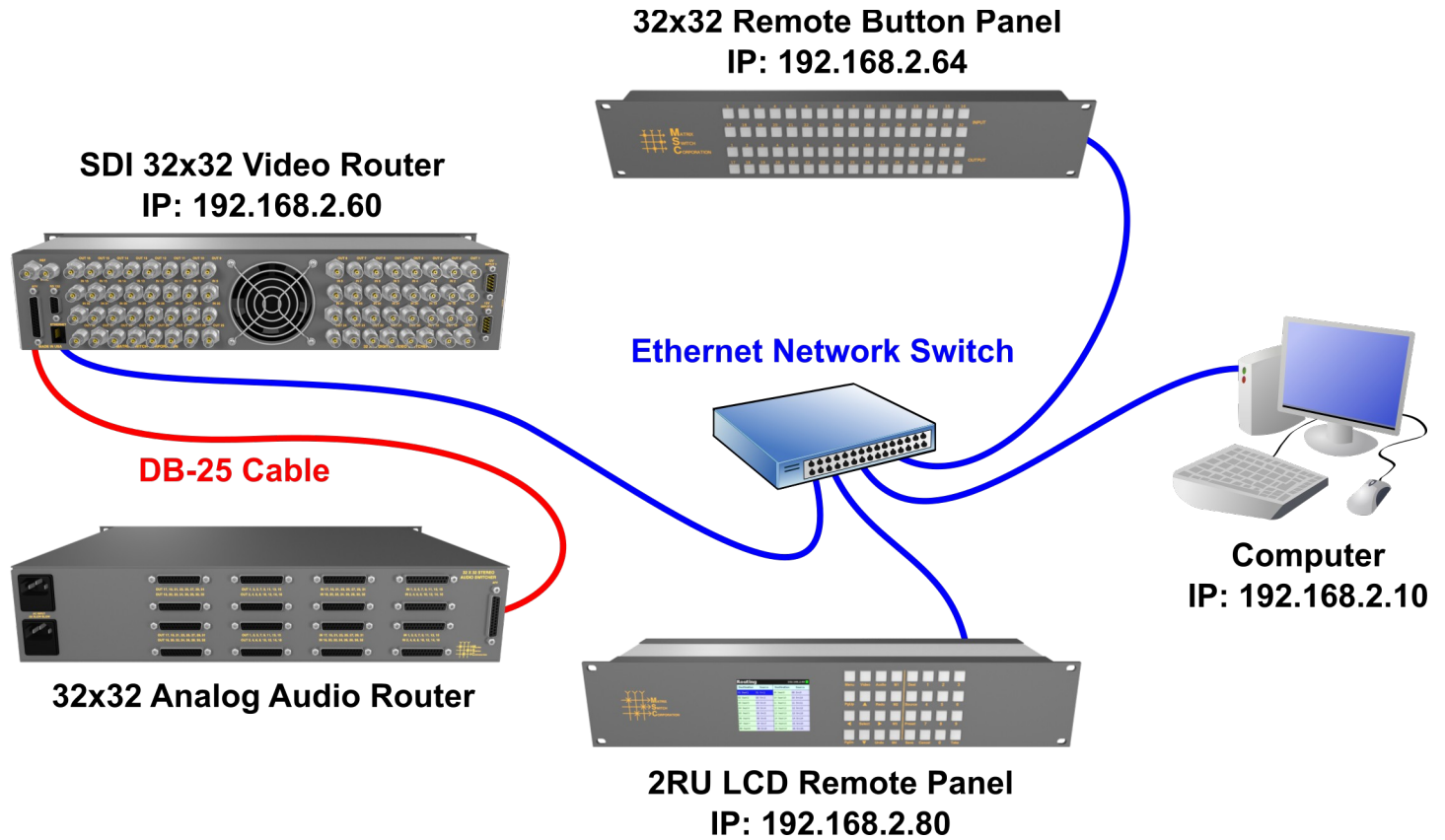
2 LCD User Interface

2.1 Overview

The MSC-GCP2U32 LCD control panel interface consists of a QVGA LCD screen and 32 buttons as depicted in Figure 1.

Figure 1: MSC-GCP2U32 LCD Interface

2.1.1 Modes and Scopes

Operation of the LCD user interface depends on the current mode of the panel. Modes are activated by specific buttons or by navigating and activating items listed on the display. Additionally Scopes describe overlapping functionality that can be active simultaneously with the current Mode. Table 1 lists Modes and Scopes of the LCD user interface.

Mode/Scope	Description
Global	Buttons in the Global scope are always available, regardless of the current panel Mode.
Navigation	The Navigation scope is active when the Edit scope is not active and one or more selectable items are displayed.
Edit	The Edit scope is active when editing a configuration parameter.
Preset	Preset mode is active when selecting a preset number to recall from or save to.
Destination	Destination mode is active when selecting a destination for a crosspoint selection operation.
Source	Source mode is active when selecting a source for a crosspoint selection operation.

Table 1: Modes and Scopes

2.1.2 Buttons

As seen in Table 2 the functionality of the user interface buttons depend on the current Mode and Scope of the panel. Buttons are shown colored by functionality and scope in Figure 2 with the following key:
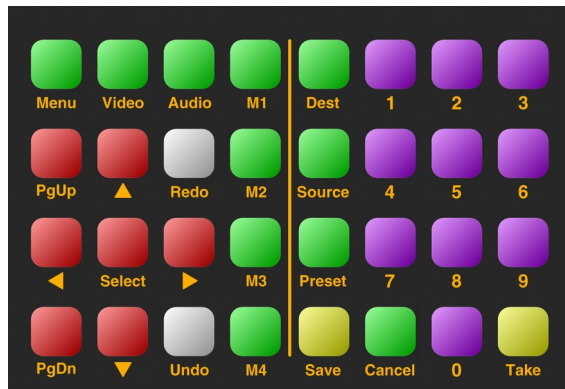
Figure 2: Interface Buttons

- ■ Green – Global buttons
- ■ Red – Navigation buttons
- ■ Purple – Number pad buttons
- ■ Yellow – Save and Take buttons

In subsequent button illustrations, the available buttons for the interface page being described are colored and the non-applicable buttons are left as plain white.

Buttons	Description	Modes/Scopes
Menu	Menu access button	Global
Video/Audio	Video and Audio toggle buttons	Global
M1-M4	Macro buttons (refer to the Mascot Macros Command for details)	Global
Dest	Destination key-in mode activation	Global
Source	Source key-in mode activation	Global
Preset	Preset recall or store mode	Global
Cancel	Cancel operation	Global
PgUp/PgDn	Page Up and Page Down	Navigation
Arrows	Navigation arrows	Navigation
Select	Select or confirm an action	Navigation
Save	Data save	Preset
Take	Activate crosspoint routing change	Preset, Dest, Source
0-9	Numbered buttons	Navigation, Preset, Dest, Source
Undo/Redo	Undo and Redo (not currently used)	

Table 2: Buttons

2.1.3 Navigation

Most pages of the user interface consist of tabular information that can be navigated (as shown in Figure 3). The currently selected item is highlighted by a different background and foreground. When multiple items are displayed, the **Up** and **Down** arrows can be used to move the selection up or down by one item, **PgUp** and **PgDn** can be used to move up or down by a complete page and the **Left** and **Right** arrows can be used to select

the item to the left or right of the current selected item (equivalent to **PgUp** and **PgDn** when there is only one column).

Items in the tabular information are identified by number, which is the first number displayed at the beginning of the item's text. This number can be keyed-in with the **Number Pad** (Buttons 0 through 9), for quick access. As digits are keyed-in, the active selection will move to the next matching item with the given number, for example pressing **1** followed by **4** will select entry 01 first followed by 14. The selection stops updating once the keyed in digits no longer match an available item number. The key-in operation can be reset by pushing any of the navigation buttons.

Figure 3: Navigation and Status Bar

Once the desired item is selected, it can be activated by pressing the **Select** button, the effect of which depends on the current interface page.

2.1.4 Status Bar

After the system starts up the status bar is displayed in all modes at the top of the screen (shown outlined in red in Figure 3).

The status bar consists of:

- **Mode Title** (in the left corner – "Routing" in the example image). Indicates what section of the user interface is currently active.
- **Active Control Profile** (to the right – "192.168.2.60" in the example image). Displays the name of the current routing switcher control profile (useful when controlling multiple routers).
- **Connection Status** (in the right corner - "🟩" in the example image). This indicator shows the current routing switcher connection status, which includes the following indicators:
  ○ 🟩 - Indicates that a connection has been established with the remote routing switcher.
  ○ ❓ - Displayed on initial connection when routing matrix state has not yet been updated.
  ○ ❗ - Shown when a communication error occurs with the remote routing switcher.

2.2 Routing – Single Level

The **Routing** page is the default interface page and the active interface after device startup.

Note: pressing the **Cancel** button in most other modes will return the interface to the **Routing** page.

The current routing connection matrix state is shown, as seen in Figure 4, one item per destination, with the destination number and label followed by the connected source number and label. The **Navigation** buttons can be used to change the currently selected item and to scroll through multiple pages if applicable.

Figure 4: Routing

2.2.1 Changing a Crosspoint

There are 2 methods which can be used to change a matrix crosspoint connection called **Navigation Method** and **Key-In Method** described below.

Navigation Method

1. Navigate to the desired destination item using the **Navigation** buttons.
2. Press the **Select** button to activate **Source Mode**.
3. The **Select Source** page is shown with the currently connected source highlighted (Figure 5).
4. Navigate to the source which is intended to connect to the active destination.
5. Press the **Select** or **Take** buttons to complete the crosspoint connection or press **Cancel** to keep the existing connection and return to the **Routing** page.

Figure 5: Routing Select Source

Key-In Method

1. Press the **Dest** button which will activate Destination Mode, buttons **0** through **9**, **Dest** and **Cancel** will flash awaiting further input (Destination Mode can be canceled by pressing the **Cancel** button or after 20 seconds of inactivity).
2. Key-in the desired destination of the crosspoint change using buttons **0** through **9** and the currently selected destination will update accordingly on the display. To re-enter the destination number, press the **Dest** button again.
3. Press the **Source** button which will activate Source Mode, buttons **0** through **9**, **Source**, **Cancel** and **Take** will flash awaiting further input (Source Mode can be canceled by pressing the **Cancel** button or after 20 seconds of inactivity).
4. Key-in the desired source of the crosspoint change using buttons **0** through **9** and the currently selected source will update accordingly on the display. To re-enter the source number, press the **Source** button again.

5. Press the **Take** button to complete the crosspoint connection or press **Cancel** to keep the existing connection and return to the **Routing** page.

2.3 Routing - Multi Level Audio/Video

When controlling a routing switcher with multiple levels, such as Video and Audio, the Routing display is depicted as in Figure 6.

For each destination the destination labels and the currently connected source numbers and labels for both levels are shown.
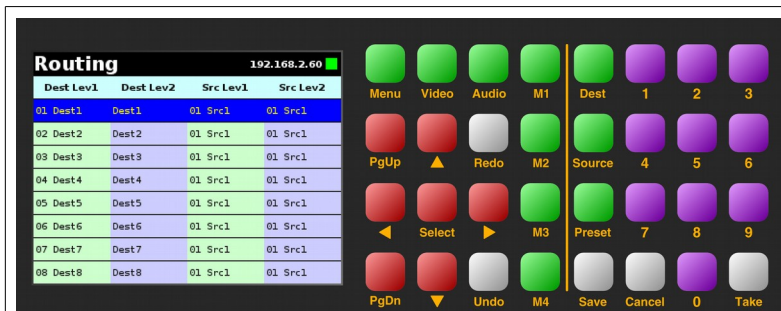
Figure 6: Multi Level Routing

The **Navigation** buttons can be used to change the currently selected item and to scroll through multiple pages if applicable.
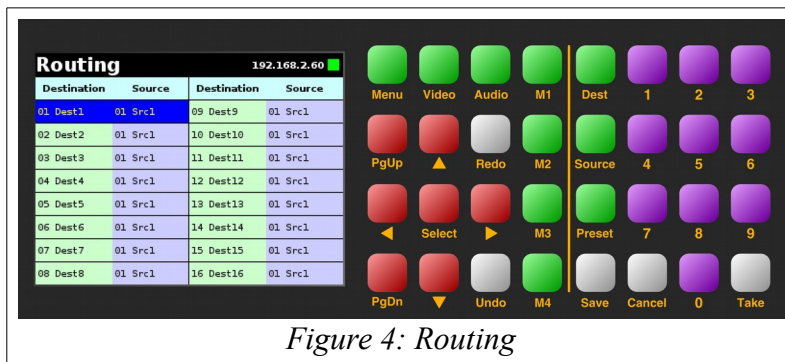
2.3.1 Changing a Multi Level Crosspoint

There are 2 methods which can be used to change a matrix crosspoint connection called **Navigation Method** and **Key-In Method** described below.

Both methods utilize the **Audio** and **Video** buttons to toggle which levels of the crosspoint will be modified by crosspoint changes. If the **Video** button is toggled on, only the 1st level will be changed. If the **Audio** button is toggled on, only the 2nd level will be changed. If both **Video** and **Audio** buttons are toggled off, then both levels will be changed.
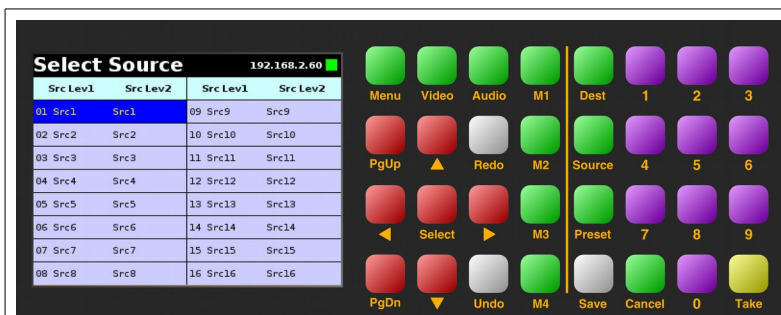
Figure 7: Routing Select Multi Level Source

Navigation Method

1. Navigate to the desired destination item using the **Navigation** buttons.
2. Press the **Select** button to activate **Source Mode**.
3. The **Select Source** page is shown with the currently connected source highlighted (Figure 7 - shown with both Video and Audio levels active).
4. Toggle on or off the **Video** and **Audio** buttons to the desired setting of the levels to be changed, if necessary. The **Select Source** levels displayed will be updated accordingly.
5. Navigate to the source which is intended to connect to the active destination levels.
6. Press the **Select** or **Take** buttons to complete the crosspoint connection or press **Cancel** to keep the existing connection and return to the **Routing** page.
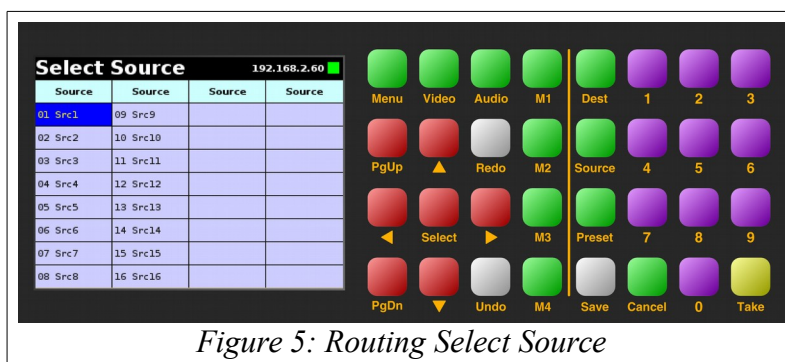
Key-In Method

1. Press the **Dest** button which will activate Destination Mode, buttons **0** through **9**, **Dest** and **Cancel** will flash awaiting further input (Destination Mode can be canceled by pressing the **Cancel** button or after 20 seconds of inactivity).
2. Key-in the desired destination of the crosspoint change using buttons **0** through **9** and the currently selected destination will update accordingly on the display. To re-enter the destination number, press the **Dest** button again.
3. Press the **Source** button which will activate Source Mode, buttons **0** through **9**, **Source**, **Cancel** and **Take** will flash awaiting further input (Source Mode can be canceled by pressing the **Cancel** button or after 20 seconds of inactivity).
4. Key-in the desired source of the crosspoint change using buttons **0** through **9** and the currently selected source will update accordingly on the display. To re-enter the source number, press the **Source** button again.
5. Toggle on or off the **Video** and **Audio** buttons to the desired setting of the levels to be changed, if necessary. The Select Source levels displayed will be updated accordingly.
6. Press the **Take** button to complete the crosspoint connection or press **Cancel** to keep the existing connection and return to the **Routing** page.

2.4 Presets

Matrix Switch Corporation routing switchers can store up to 10 presets.

The MSC-GCP2U32 can recall a preset or store the current entire routing matrix to a preset on the router.

Figure 8: Presets

At this time, the MSC-GCP2U32 does not support storing partial presets or building arbitrary presets not based on the current routing matrix using the LCD interface. However, the web page interface or command protocol can be utilized for these purposes.
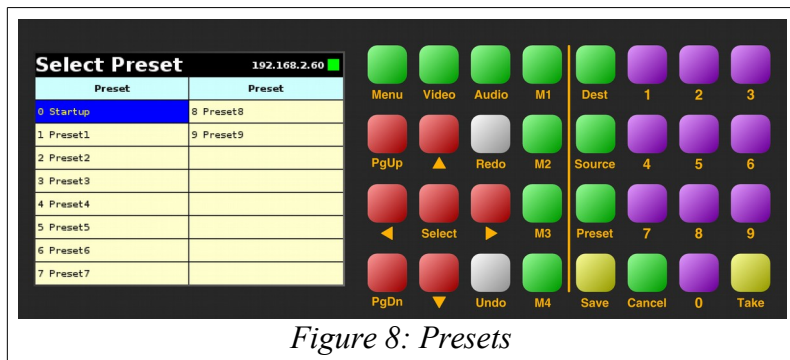
2.4.1 Recalling a Preset

Presets can be recalled using the following procedure:

1. Press the **Preset** button which will bring up the **Select Preset** page as seen in Figure 8. Pressing the **Cancel** button or 20 seconds of inactivity will cancel **Preset Mode** and return to the **Routing** page.
2. Navigate to the desired preset using the **Navigation** buttons.
3. Press the **Take** or **Select** buttons to recall the preset to the current matrix routing state.

2.4.2 Store a Preset

The entire routing matrix state can be stored to a preset using the following procedure:

1. Press the **Preset** button which will bring up the **Select Preset** page as seen in Figure 8. Pressing the **Cancel** button or 20 seconds of inactivity will cancel the Preset mode.
2. Navigate to the desired preset using the **Navigation** buttons.
3. Press the **Save** button to store the current matrix routing state to the selected preset.

2.5 Menu

The menu pages are used for accessing other areas of the MSC-GCP2U32, including device information and configuration.

To access the menu at any time, press the **Menu** button which will display the last used menu page (Main Menu by default, as seen in Figure 9).
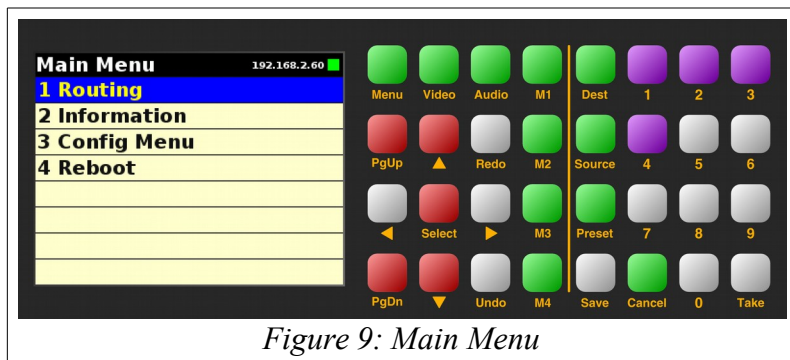
Figure 9: Main Menu

Navigation within menus is identical to other areas of the interface, including the **Navigation** buttons, **Number** buttons and **Select**.

2.6 Information

The **Information** page is accessed from the **Main Menu** and shows the current Software Version. To return to the **Main Menu** press the **Menu** button. Pressing **Cancel** will return to the Routing page.

2.7 Configuration

Configuration of the MSC-GCP2U32 is accessed with the **Config Menu** (Figure 10) and several sub menus each of which is described below.

2.7.1 General Config

General configuration consists of the following options (as seen in Figure 11):

1. Enable LCD blanking
2. LCD blank time
3. Serial baud rate
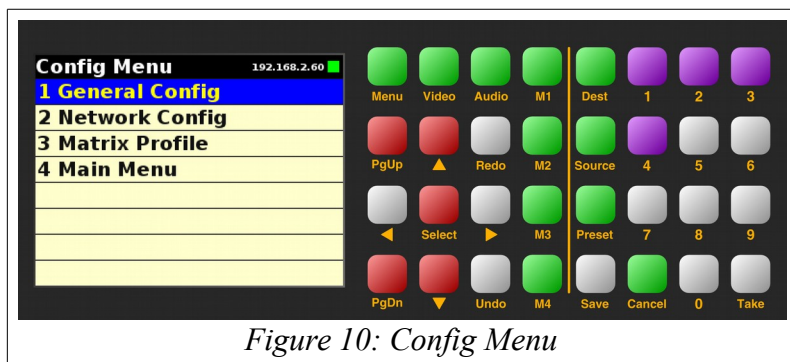
Figure 10: Config Menu

The **LCD Blanking** feature causes the LCD backlight to be turned off after a specified number of seconds of button inactivity.

To enable or disable this option navigate to the configuration option and press the **Select** button to toggle the current value. To set the LCD blanking time, navigate to the configuration option, press the **Select** button to activate **Edit Mode** and use the **Up** and **Down** arrows or **PgUp** and **PgDn** to increase or decrease the value in seconds. To exit **Edit Mode** press **Select** again to save the selected value or **Cancel** to keep the previous value.
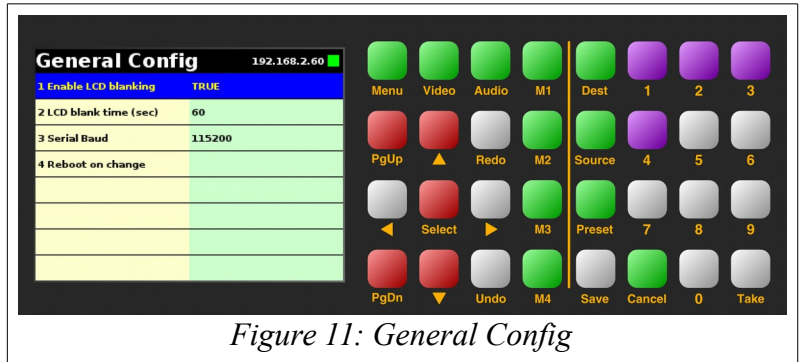
Figure 11: General Config

The **Serial Baud Rate** can be changed by navigating to the configuration option, pressing **Select** to enter **Edit Mode** and using the **Up** and **Down** arrows to change the value. To exit **Edit Mode** press **Select** again to save the selected value or **Cancel** to keep the previous value. After changing the serial baud rate, the system needs to be rebooted for the changes to take effect. The **Reboot** item on the **General Config** page can be used for this purpose, by navigating to it, pressing the **Select** button and confirming the reboot dialog.

2.7.2 Network Config

The network configuration can be changed from this page as seen in Figure 12.

Parameters include the following:

1. DHCP Enable
2. IP Address
3. Netmask
4. Gateway
5. Primary DNS
6. Secondary DNS
7. Router IP
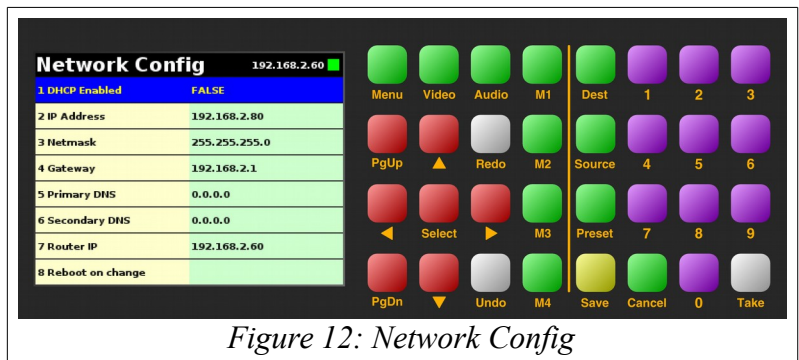
Figure 12: Network Config

Note: After changing network parameters, the system needs to be restarted for the changes to take effect. The **"Reboot on change"** can be used for this purpose by navigating to it, pressing the **Select** button and confirming the **Reboot** dialog.

DHCP can be enabled or disabled by navigating to it and pressing the **Select** button to toggle the current state. If enabled the remaining network settings (except **Router IP**) are not used and the network configuration will be obtained from the network's DHCP server.

To set any of the remaining IP address settings, navigate to the parameter of interest and press the **Select** button

to enter **Edit Mode**. The first decimal number will be highlighted, awaiting input. Enter the desired value with the **Number** buttons **0** through **9**. The **Right** or **Left** arrows are used to select the next or previous IP address decimal number. To exit **Edit Mode** press the **Select** or **Save** buttons to store the new value or **Cancel** to discard the entered value and use the old one.

If DHCP is not enabled, the MSC-GCP2U32 will use the manual network configuration. This includes the following settings: **IP Address** (192.168.2.80 by default), **Netmask** (255.255.255.0 by default) and **Gateway** (192.168.2.1 by default). The Gateway address is only used when controlling routers outside of the current IP subnet. The **Primary** and **Secondary** DNS entries are not currently needed and default to 0.0.0.0.

The **Router IP** setting allows for assigning the IP address of a single router to control. Setting up multiple router control profiles currently requires using the web page or command protocol interfaces for configuration, although the panel can be used to select between the available profiles.

2.7.3 Matrix Profile

The **Matrix Profile** page is accessed from the **Config Menu** and can be used to select the active router control profile.

Note: Configuring the available router control profiles on the MSC-GCP2U32 currently requires using the Mascot MtxProfiles Command.

Figure 13: Matrix Profile

To select the current active router control profile navigate to the **Matrix Profile** page from the **Config Menu**. The names of the available router control profiles will be listed as in Figure 13. Navigate to the desired profile and press **Select** to activate it. The interface will return to the default **Routing** page and the new profile name will be shown on the right side of the status bar.

The **M1-M4** buttons are also configured by default to select one of the first 4 profiles. Refer to the Mascot Macros Command for more details.

2.8 Reboot

The **Reboot** dialog (Figure 14) can be accessed from the Main Menu, General Config and Network Config pages.

The **Left** and **Right** arrows can be used to navigate between the **Reboot** and **Cancel** options. Pressing the **Select** button on the **Reboot** option will reboot the system after a short delay and the **Cancel** option will return the interface to the Routing page. The **Cancel** button can also be utilized to cancel the reboot.

Figure 14: Reboot

3 Web page interface

3.1 Overview

Figure 15: Routing Tab
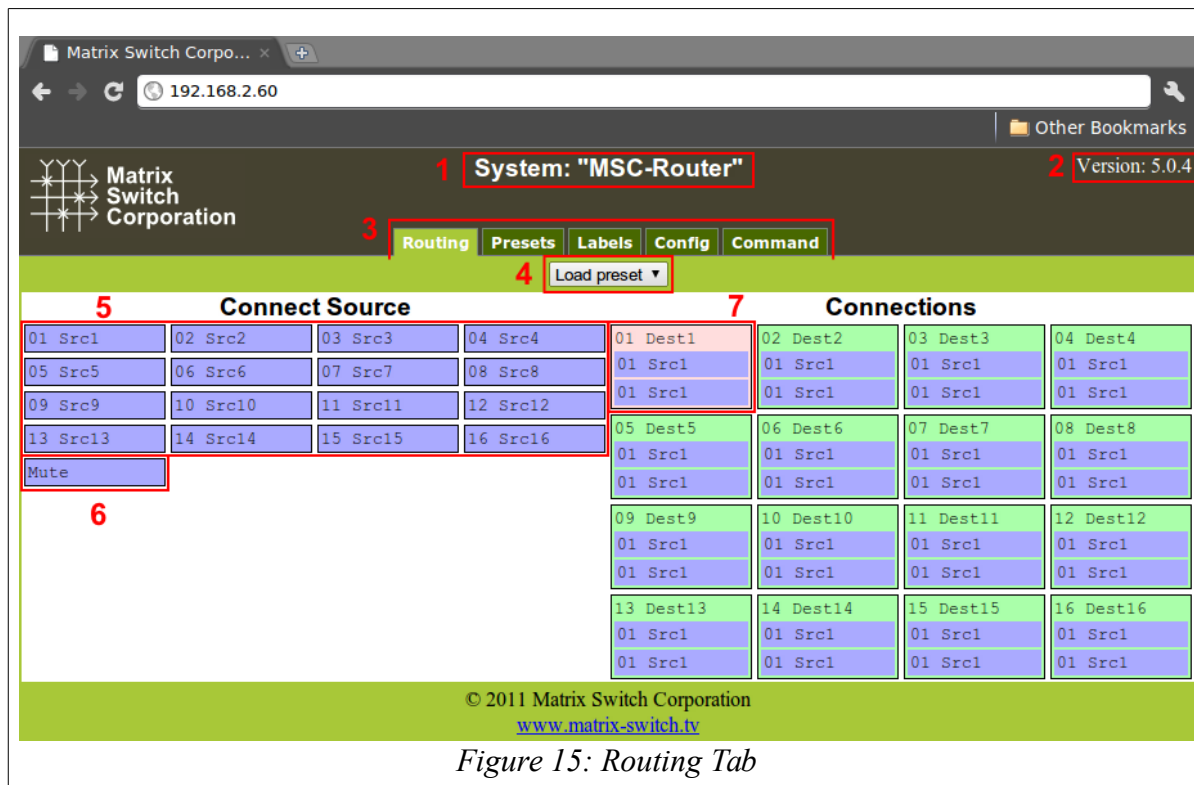
All Matrix Switch Corporation Router and Remote Panel systems include a built in web page that can be used with standards compliant Javascript enabled web browsers, including but not limited to Firefox, Chrome, Safari and recent versions of Internet Explorer.

NOTE: The MSC-GCP2U32 LCD panel acts as a router proxy and offers many of the same control interfaces as a router, including the Routing, Presets and Labels web interface tabs. Refer to the Virtual Routing section for more details.

Figure 15 shows the Routing tab of a 16x16 switcher with 2 levels with numbered outlines to aid in further description below. The web page interface for other router systems is sized appropriately. Remote Panels show only the Config and Command tabs.

Numbered sections in Figure 15
1. System name (can be assigned on the Config tab)
2. System firmware series and version
3. Tab navigation
4. Preset load drop down selection
5. Source connect buttons
6. Mute button (may not be available on all switchers and levels)
7. Currently selected destination (destination name followed by currently connected source names for both

levels).

3.2 Routing Tab

The right side of the Routing tab interface under the title "Connections" displays the current state of the routing matrix. Each destination is depicted as a box containing the destination number/label followed by one or more source numbers/labels of the currently connected sources for each level of the destination. The currently selected destination is highlighted in red (**#7** in Figure 15). For multi-level systems either the destination or one of the levels can be individually selected for changing all levels or a single level.

The left side of the Routing tab under the title "Connect Source" (**#5** in Figure 15) displays all the available sources and Mute (if available) to connect from.

3.2.1 Changing a connection

To change a routing connection, select the desired destination by clicking on the Destination label or an individual level source label (multi-level systems only). Then click on a Source button or Mute (if available) from the "Connect Source" section. The clicked source will be connected to the selected Destination for one or more levels (depending on if the Destination or a single level is selected).

3.2.2 Loading a preset

Presets store connection states for one or more Destinations. Loading a Preset on the Routing tab consists of simply clicking on the "Load preset" drop down selector (**#4** in Figure 15) and selecting the desired preset, which is then loaded and applied to the current routing matrix. More information on Presets is contained in the following Presets tab section.

3.3 Presets Tab
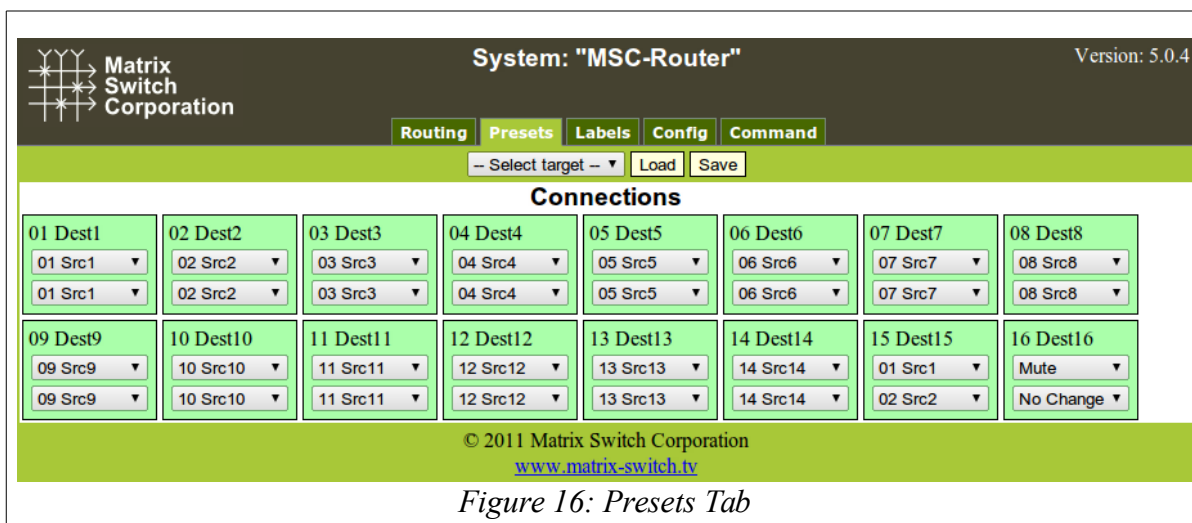
Figure 16: Presets Tab

Figure 16 depicts the Presets Tab which can be used to edit presets or perform batch matrix connection operations. Under the "Connections" title is shown the **Work Matrix**, which is a temporary area for working with matrix routing and loading to/saving from stored **Presets** and the current **Active Routing** state. For each

Destination the Destination number and label is displayed followed by one or more drop down selection lists for each source level. The selection lists contain all available sources (listed by source number and label) and the special values **No Change** and **Mute** (the latter only if available for the given level). The **No Change** option indicates that the Destination for the given Level should not be changed from its current value, when the preset is recalled, which allows for a subset of the routing matrix to be changed. **Mute** will output blank Video or silent Audio for the given Destination level and is not supported on all routers/levels.

3.3.1 Loading Work Matrix from a source target

The **Work Matrix** can be loaded from the current **Active Routing** matrix or a Preset. Simply select the desired source target from the "Select target" drop down list and click the **Load** button.

3.3.2 Saving Work Matrix to a target

The **Work Matrix** can be saved to one or more targets including the **Active Routing** matrix or a **Preset**. Simply select the desired destination target from the "Select target" drop down list and click the **Save** button. When saving to the **Active Routing** matrix, the connections defined in the **Work Matrix** will become immediately active for the current routing state, allowing for batch routing operations to be performed and executed simultaneously. Saving to a **Preset** will store the Work Matrix state to non volatile memory, which persists through device power cycles and can be recalled at a later time.

3.3.3 Usage scenarios

The flexibility of the Presets Tab interface allows for several useful scenarios, some of which are described below:

- **Batch connection operations** – To perform several connection operations all at the same time: make the desired connection changes to the **Work Matrix**, leaving all others as "No Change", and then apply the changes to the **Active Routing** target by selecting it from the "Select target" drop down and clicking the **Save** button.
- **Store Active Routing matrix state to a Preset** – The entire **Active Routing** matrix state can be stored to a Preset by first loading it to the **Work Matrix**, followed by selecting the desired target Preset and clicking the **Save** button.
- **Editing an existing Preset** – Editing a Preset is done by loading it to the **Work Matrix**, making the desired changes and saving it back to the same Preset. All this is accomplished without changing the **Active Routing** matrix state.

3.4 Labels Tab

Figure 17: Labels Tab

Figure 17 shows the Labels Tab. Click on a field or use the tab key to step between fields. Label names are limited to 8 characters including spaces. Multi-level routers will have columns for Video and Audio Sources and Destinations. Single level routers will have a column for Source labels and one for Destination labels. On multi-level routers, secondary levels can be left blank to use the same label as the first level. Presets can also be assigned label names. Click the **Save** button to save changes that have been made.

3.5 Config Tab

Figure 18: Config Tab

Figure 18 depicts the Config Tab as seen on a Router system beginning with Carina Series Firmware 5.3.0. Configuration fields vary depending on router features, firmware version and if the device is a Remote Panel.

NOTE: After changing any configuration settings click the **Save** button. All **Network Settings** changes require a Reboot of the device in order to take effect. After clicking **Save**, click the **Reboot** button to restart the device. Remember to enter a new IP address into your Web browser's Location bar, if the device's IP address has changed.

3.5.1 System Settings

- **System Name** – A descriptive name of the system (up to 15 characters), displayed at the top of the Web Page interface which is helpful when managing multiple systems.

3.5.2 Network Settings

WARNING: **DHCP** should only be enabled or the **IP Address** or **Netmask** changed if one has an understanding of TCP/IP network configuration. Once the save button is pressed and the system is rebooted any changes to DHCP enable, the IP Address or the Netmask shall result in having to access the web page with the new settings. If there are Matrix Switch Corporation remote control panels which access the system which has been changed, they must also be reconfigured to use the new router IP address as well. See the Network Planning section for more helpful information on planning your network.

- **Enable DHCP** – Check this box to enable DHCP. Disables IP Address, Netmask and Gateway fields as these settings are obtained from the DHCP server.
  - **WARNING:** A DHCP server must be present on your network for this to function properly. Using DHCP allows for dynamic IP or fixed IP assignment from a central location (the DHCP server). Using this option is only recommended if using fixed IP assignment based on the device's MAC address or if there is a way to determine what IPs the devices get assigned. Otherwise it may become difficult to determine what IP address to use when accessing the Web Page or utilizing other Ethernet control interfaces.
- **IP Address** – The IP address of the system.
- **Netmask** – The system network mask.
- **Gateway** – The IP address of your network's Gateway, if applicable. Only necessary on systems which access other systems outside of your network (a remote panel which accesses a router on a different network for example).

3.5.3 Button Panel Settings

These settings control the operation of the device's button control panel interface (if applicable).

Four fields are provided for specifying what portion of a router is controlled by the button panel interface. This provides added flexibility in defining what destinations and sources a panel controls. Some examples of use include, using multiple 16x1 Remote Panels (16 source, 1 destination) to control individual destinations of a 16x4 Router (16 source, 4 destination). Another usage scenario would be to have 2 separate panels control different levels of a Video/Audio Router.

NOTE: The MSC-GCP2U32 LCD panel offers advanced Virtual Routing capabilities and has the ability to control multiple routers via profiles. The **Remote Router IP** setting offers a way of adding a **simple** router profile to control. However, the Virtual Routing section should be referenced for details on fully utilizing the Virtual Routing system.

- **Remote Router IP** – The IP address of the remote Router to control.
- **Dest Offset** – This setting determines what destination the button panel starts on. Defaults to 0 which means the control panel starts on destination 1. Setting this value to 8 for example would cause the first destination of the button panel to control destination 9.
- **Source Offset** – This setting determines what source the button panel starts on. Defaults to 0 which means the control panel starts on source 1. Setting this value to 8 for example would cause the first source of the button panel to control source 9. NOTE: If the currently active source cannot be represented on the control panel, no source button LED will light.
- **Level1 Override** – This setting determines the primary control level of the button interface. It defaults to 0 which is equivalent to level 1, usually a Video level. Setting this value to 2 for example would set the primary level to be level 2 (usually Audio).
- **Level2 Override** – This setting determines the secondary control level of the button interface. It defaults to 0, which if the Level1 Override is also 0 is equivalent to level 2, but if the Level1 Override is a value other than 0, the secondary level control is disabled. Can only be assigned a non-zero value if Level1 Override is also non-zero. If set to 3 for example, the secondary level would be level 3.

3.6 Command Tab
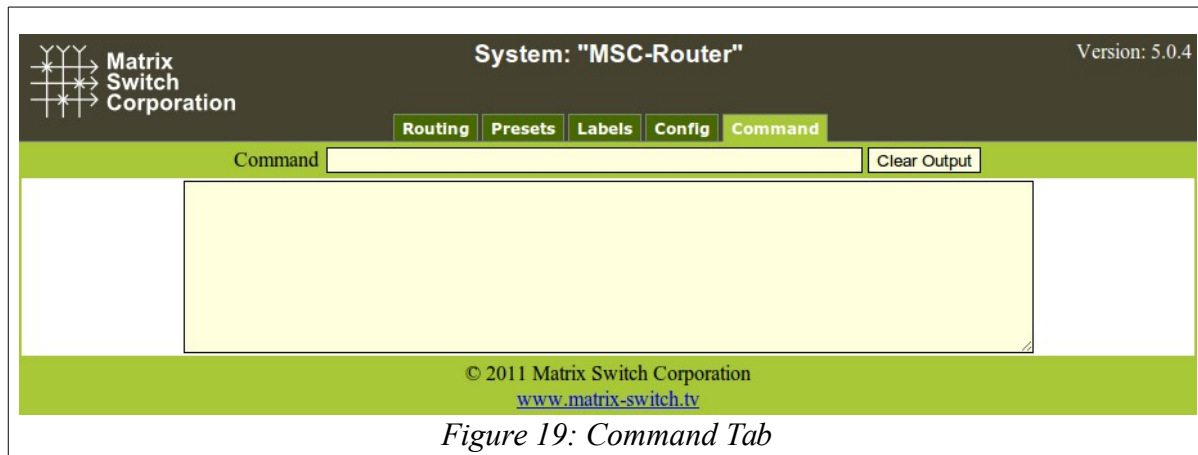
Figure 19: Command Tab

The Command Tab (Figure 19) provides access to the Mascot protocol interface. Commands are typed on the Command text entry line followed by pressing the Enter key to execute them. The results will be displayed in the text area below the command line. Clicking the **Clear Output** button will clear all command output in the lower area.

See the section Mascot Control Protocol for more information.

4 Virtual Routing

Understanding the details of virtual routing is only necessary for more advanced routing scenarios and not simple cases of controlling one or more individual routers. In the simple routing scenario, at a minimum the rest of this section and the Simple Matrix Profiles section below are suggested reading. Please contact Matrix Switch Corporation if you need system configuration assistance.

The MSC-GCP2U32 LCD panel supports **Virtual Routing** which is a software feature used for customizing the media routing infrastructure of one or more Matrix Switch Corporation video/audio devices. This feature provides a level of abstraction which can be used for advanced routing scenarios, such as: combining multiple audio/video devices into a single multi-level virtual router, Source/Destination remapping, controlling a subset of a Matrix and Source/Destination combining for creating larger multi-system matrices.

Virtual routing is configured using the Mascot MtxProfiles Command which can be used to define one or more Virtual Routing Matrices, an example is controlling multiple individual routers and selecting between the profiles using the M1-M4 Macro Buttons. The FrameIP Command can also be used for adding simple matrix profiles for controlling a router without advanced virtual routing.

4.1 Simple Matrix Profiles

A simple matrix profile specifies the control of a single router at a given IP address and is a subset format of the more advanced virtual matrix profiles described in additional sections.

Virtual matrices are specified using JSON. JSON is a text format for defining structured data, which was adopted from Javascript. More information can be found at http://www.json.org.

NOTE: A word surrounded by <> characters acts as a placeholder for further definition. For example **<URL>** is defined as a string consisting of an IP address with optional TCP/IP port number separated by a colon.

Simple virtual matrix JSON object structure
```
{
  "name" : "<NAME>",
  "routers" : [ "<URL>" ]
}
```

- **<NAME>:** An optional name identifying this profile. For simple profiles the IP address of the router is usually used, if name is not specified.

- **routers:** Specifies an array of strings, which for a simple profile, defines a single router device to control.

- **<URL>:** Currently a Frame URL consists of an IP address of a Router device optionally followed by a colon and a Mascot protocol TCP/IP port number (defaults to port 40 if not specified). For example "192.168.2.60" or "10.0.0.20:4000".

The MtxProfiles Command defines an array of matrix profiles and consists of a JSON array of virtual matrix objects.

4.2 Virtual Matrix Types

Virtual Routing is defined by a **Virtual Matrix** which consists of one or more Levels. Each Level routes a single media type (video or audio) and is further defined by the number of Sources and Destinations it has.

Each Level in a Virtual Matrix can be independently defined from one of the matrix types **Remap**, **Duplicated Sources** and **Chained** further described below.

Name	Remap
Description	Defined by maps of arbitrary Sources and Destinations.
Uses	Re-order Sources/Destinations. Create a subset Matrix for controlling less Sources/Destinations than the device provides.
Constraints	1 device only. The resulting Virtual Matrix will have the same number of Sources and Destinations or a subset thereof.

Name	Duplicated Sources
Description	Sources are duplicated externally using Distribution Amplifiers (DAs) or other means and routed to the inputs of 2 or more routing devices.
Uses	Destination expansion (combined Destination count of all devices).
Constraints	2 or more devices each making use of the same number of Sources. The resulting Virtual Matrix will have the same number of Sources as a single device and the sum of Destinations of all devices.

Name	Chained
Description	The outputs of 2 or more "Secondary" routers are connected to the inputs of a "Primary" router.
Uses	Source expansion (combined Source count of all Secondary routers).
Constraints	3 or more routers, one is the final Primary router and all others are Secondary routers. The number of used Destinations for each Secondary router should be the same as the Primary router Destination count. The sum of all Secondary router Destination counts should not exceed the Primary router's Source count.

The Remap virtual matrix type can specify whether the panel is the master controller of different router data resources, including level information (name, media type and feature flags), current matrix routing state, destination/source/preset labels and preset data. Duplicated and Chained virtual matrix types always use the panel as the master controller of all of the data resources.

Note: When using multiple MSC-GCP2U32 panels to control an advanced routing matrix, one panel should be configured as the master which has the virtual matrix definition assigned to it. The other panels would be configured to control the master panel as a proxy router using a simple matrix profile. This ensures that the routing resources are controlled by a single device, which the other devices synchronize to.

4.3 Virtual Matrix JSON Format

More advanced virtual matrix routing is described in this section and expands on the information in the Simple

Matrix Profiles section.

Virtual matrix JSON object structure

```
{
  "name" : "<Name>",
  "routers" : [ "<URL>", ...],
  "levels" : [ <LevelObj>, ...]
}
```

- **<Name>:** Optional name identifying this profile. For simple profiles the IP address of the router is usually used, if name is not specified.

- **routers:** Specifies an array of strings defining one or more Router devices which are used by the virtual matrix.

- **<URL>:** Currently a Frame URL consists of an IP address of a Router device optionally followed by a colon and a Mascot protocol TCP/IP port number (defaults to port 40 if not specified). For example "192.168.2.60" or "10.0.0.20:4000".

- **levels:** Optional array which defines each level of the virtual matrix. If not specified, then the virtual matrix will consist of the first Router device with the same number of levels and source/destination counts.

- **<LevelObj>:** One of the 3 level objects Remap, Duplicated or Chained as described below.

The JSON object structures for each virtual matrix type are defined below. All of them share the following field values:
- **<Name>:** Optional name identifying this level, for example "SDI Video".
- **<MapType>:** String identifying the type of virtual matrix, which can be the value "remap", "duplicated" or "chained".
- **<Map>:** Source or Destination mapping strings, defined in the Map Strings section.

Remap Virtual Matrix Object

```
{
  "mapType" : "remap",
  "name" : "<Name>",
  "masterFlags" : "<MasterFlags>",
  "srcMap" : "<Map>"
  "destMap" : "<Map>"
}
```

- **<MasterFlags>:** Defines the master device of router data resources. Flags are separated by spaces and are case sensitive. If a flag is specified, then the MSC-GCP2U32 panel is the master of the resource data, otherwise the resource is retrieved from the router being controlled.
  - **struct:** Level info such as level name, media type and level feature support flags. If specified then values are stored on the panel, otherwise they are acquired from the router.

  - **state:** Routing state. If this flag is specified, then the matrix routing state is controlled by the panel (master) otherwise the routing state is synchronized from the router.

○ **destLbls:** Destination labels. If this flag is specified then destination labels are stored on the panel (master), otherwise the labels are synchronized from the router.

○ **srcLbls:** Source labels. If this flag is specified then source labels are stored on the panel (master), otherwise the labels are synchronized from the router.

○ **psetLbls:** Preset labels. If this flag is specified then preset labels are stored on the panel (master), otherwise the labels are synchronized from the router.

○ **psets:** Preset data. If this flag is specified then preset routing data is stored on the panel (master), otherwise the preset data is synchronized from the router.

• **srcMap:** Defines the sources of the remap matrix.

• **destMap:** Defines the destinations of the remap matrix.

Duplicated Virtual Matrix Object

```
{
  "mapType" : "duplicated",
  "name" : "<Name>",
  "srcMaps" : [ "<Map>", ...],
  "destMap" : "<Map>"
}
```

• **srcMaps:** Defines an array source maps, one for each Router frame. Each map should contain the same number of sources.

• **destMap:** Defines the destinations of the virtual matrix which is normally the combined outputs of all the frames.

Chained Virtual Matrix Object

```
{
  "mapType" : "chained",
  "name" : "<Name>",
  "srcMap" : "<Map>",
  "chainMap" : [ "<Map>", "<Map>" ],
  "destMap" : "<Map>"
}
```

• **srcMap:** Defines the Sources of the chained matrix which consists of the combined sources of all secondary Routers.

• **chainMap:** The chain map consists of an array of 2 mapping strings. The first specifies the "From" map which is the Destinations of all Secondary Routers which are connected to the "To" map, the 2nd map in the array, defining all the Sources of the Primary Router. Both mappings must consist of the same number of values.

• **destMap:** Defines the Destinations of the chained matrix which are the final outputs of the Primary Router.

4.3.1 Map Strings

Mapping strings define a set of Sources or Destinations (depending on context) of one or more Router devices and levels. Each map item value is separated by a comma ',' and defines a single source/destination, a range of values or "all" available values.

Source/destinations are specified as decimal numbers starting from 1. Ranges consist of 2 decimal numbers separated by a dash. If the value "all" is specified it indicates that all available sources or destinations should be used. Additionally each value can optionally be preceded by a router index or router index/level specifier, separated from the value by a colon ':'. The level, if specified, is separated from the frame index by a carrot '^'.

Map item syntax

Map Item Type	Syntax
Single Source or Destination	`Router^Level:N`
Range of Sources or Destinations	`Router^Level:N-N`
All Sources and Destinations	`Router^Level:all`

- **Router:** Specifies the index of router in "routers" array in Virtual Matrix object. Values start at 1 and defaults to 1 if not specified.

- **Level:** Specifies the level to use from the router. Values start at 1 and defaults to 1 if not specified.

- **N:** Source or Destination value specified as a decimal number. Values begin with 1.

- **all:** Literal string value used for specifying all Sources or Destinations of a level of a router.

Examples

2^1:1-16	1-16 of 1st level of 2nd Router device.
4,3,2,1	4 reverse order sources or destinations of 1st level of 1st Router device (defaults).
1:1-64,2:1-64,3:1-64	64 sources or destinations from the 1st level (default) of the 1st, 2nd and 3rd Router devices for a total of 192.
2:all	All sources or destinations from the 1st level (default) of the 2nd Router device.

4.4 Virtual Matrix Examples

In this section can be found several examples of virtual matrices defined by JSON data.

Simple matrix profile example

```
{
  "routers" : [
    "192.168.2.60"
```

```
  ]
}
```

Uses all levels and sources/destinations of the given device at IP address 192.168.2.60. This type of matrix is called a "simple" virtual routing matrix and is what gets defined when assigning a value to the Remote Router IP Address setting.

2 level 2 device 4x4 remap virtual matrix example

```
{
  "routers" : [
    "192.168.2.60",
    "192.168.2.61"
  ],

  "levels" : [
    {
      "type" : "remap",
      "srcMap" : "1^1:4-1",
      "destMap" : "1^1:1,3,2,4"
    },
    {
      "type" : "remap",
      "srcMap" : "2^2:1-4",
      "destMap" : "2^2:1-4"
    }
  ]
}
```

The above virtual matrix uses remap matrices to define a 2 level virtual system using 2 separate devices. The first virtual matrix level uses level 1 of the 1st device in the routers array, reverses the order of sources and swaps destination 2 and 3. The 2nd virtual matrix level uses 4 sources and destinations in order from level 2 of the 2nd device in the frames array.

16x128 duplicated virtual matrix

```
{
  "routers" :
  [
    "192.168.2.60",
    "192.168.2.61"
  ],
  "levels" :
  [
    {
      "type" : "duplicated",
      "srcMaps" :
      [
        "1:1-16",
        "2:1-16"
      ],
      "destMap" : "1:1-64,2:1-64"
    }
```

```
    ]
}
```

The above defines a duplicated source virtual matrix to create a 16x128 system using two 16x64 devices. The 16 sources would be externally duplicated via digital amplifiers or other equipment.

256x16 chained virtual matrix

```
{
  "routers" :
  [
    "192.168.2.60",
    "192.168.2.61",
    "192.168.2.62",
    "192.168.2.63",
    "192.168.2.64"
  ],
  "levels" :
  [
    {
      "type" : "chained",
      "srcMap" : "2^1:1-64,3^1:1-64,4^1:1-64,5^1:1-64",
      "chainMap" : [ "2:1-16,3:1-16,4:1-16,5:1-16","1^1:1-64" ],
      "destMap" : "1^1:1-16"
    }
  ]
}
```

The above defines a 256 source by 16 destination chained virtual matrix consisting of 5 devices. Each device is a 64x16, with 4 acting as Secondary devices and 1 as the Primary.

5 Mascot Control Protocol

MASCOT (**MA**trix **S**witch **CO**rporation Pro**T**ocol) provides an ASCII text based command interface via several different transports to control and get status from Matrix Switch Corporation devices. This command protocol can be utilized for manual control or for integration with automation control systems.

Mascot command interface options
- Web Page Command Tab – The most convenient user command interface, which can be accessed using a Web Browser on a Computer by the device's IP address.
- TCP/IP port 40 – A TCP/IP command interface is provided on port 40 which uses the device's Ethernet connector as a physical transport and can be accessed via a telnet application.
- RS-232 Serial Port – Serial can also be used with the configuration parameters: 115200 bps 8N1.

3rd Party support
The MASCOT protocol contains a subset of the basic ISIS Protocol command set and therefore some 3rd party equipment may work without modification using this protocol. For information about other third party control system manufacturers who support MASCOT, contact Matrix Switch Corporation.

5.1 Protocol changes

As new commands are added or other changes occur, the MASCOT protocol version is incremented. The protocol revision can be obtained using the MascotVer command.

Protocol revision history

Mascot version 2.4 (Carina Series Firmware 5.6.3)
- Added .MtxGroup, PanelDis, PanelExtEn, and Sierra commands.

Mascot version 2.3 (Carina Series Firmware 5.5.1)
- Added Quit Command, SysType Command and Vars Command which have previously been supported on the MSC-GCP2U32 only.

Mascot version 2.2 (Carina Series Firmware 5.5.0)
- The X Command now accepts a 0 valued wild card destination to switch all destinations to a given source.

Mascot version 2.1 (Carina Series Firmware 5.3.0)
- New commands: PairIO – for paired I/O 3D support, PanelOfs – for defining remote panel I/O regions to control, PanelRate – to set remote panel refresh rate, ReclkDis – for disabling SDI reclockers and RemoteSync – for synchronizing two video router systems for 3D use.
- Added E12 "Unsupported command" error which is returned when a command is not supported by the current system or settings.
- Added support for Line Feed character as a command terminator (to be compatible with older firmware). Carriage Return should normally be used.
- Added "lock" (0x02) and "reclk" (0x04) to MtxCfg Command "flags" field.

5.2 Telnet access

A telnet client can be used to access the command interface on TCP/IP port 40. Many operating systems come with a Telnet client or one can be easily obtained. To control a device using Telnet the IP address and TCP/IP port number will need to be supplied. This is typically added as arguments when executing the "telnet" command via your operating system's command prompt or run dialog. Here is an example for a device on the IP address 192.168.2.60:

```
telnet 192.168.2.60 40
```

Press the Enter key which should display the command ">" prompt character, confirming that the device is connected.

5.3 Serial access

Matrix Switch router systems and LCD remote panels come equipped with a serial port which can be used as another means of sending Mascot commands. Connect a Computer system to the device using a 9 pin RS-232 serial cable. Using this interface requires a serial terminal program, such as HyperTerminal on Windows. Configure the terminal software for 115200 bps 8N1. In addition Local Echo should be on in order to see what is typed. Pressing the Enter key once connected should yield the ">" prompt character.

5.4 Command format

Commands consist of a command name, zero or more arguments separated by commas and a carriage return (CR, ASCII 13 - the Enter key on a keyboard). Optionally multiple commands can be combined by separating them with a '#' character and the command chain is terminated with a CR character. Spaces are not required between arguments, but can be optionally supplied for readability. A space is also not required between command names and their first argument, if the argument is numeric.

Special command characters

#	Multiple command separator, for chaining commands.
<CR>	Carriage Return (ASCII 13), indicates the end of a command or chain of commands, Enter key.
<BS>	Backspace character (ASCII 11), can be used to backspace characters in interactive command shells.
"	Used for double quoting string arguments.
'	Used for single quoting string arguments.

Command example

```
X1,1#X2,2#S<CR>
```

Connects Source 1 to Destination1 and Source 2 to Destination 2, followed by displaying the Active Routing matrix status. The <CR> is the Carriage Return character.

5.4.1 Command names

Command names consist of one or more alphabetical characters and are case **insensitive**. For convenience with manual command entry they can also be matched using partial names. The first matching alphabetically sorted command is used (for example: 'H', 'He', 'hEL' or 'Help' can be used to execute the Help command). However, this feature should not be relied on with 3rd party integration, since a given partial command may execute a different command as new ones are added to the protocol.

5.4.2 Command arguments

Command arguments are separated into two categories: numeric and string arguments. These are further explained in the table below:

Command argument types			
Numeric		**String**	
Decimal (123)	1 to 3 decimal digits	Unquoted	Commands with string arguments automatically interpret argument as string (spaces and commas not allowed).
Hex (0x3D)	0xNN where NN are 2 hex digits from 0-9, A-F or a-f	Double quoted	One or more characters surrounded by double quotes ("An Argument").
		Single quoted	One or more characters surrounded by single quotes ('An Argument').

5.5 Response format

Most command responses consist of one or more values separated by newlines and ending with the '>' prompt character. **Newlines** consist of a Carriage Return/New Line (CR LF) pair of characters (ASCII 13 followed by ASCII 10).

The Prompt '>'
A prompt character '>' is displayed each time a command or chain of commands is entered, to indicate readiness to receive additional commands. If an error occurs in response to a command, an error will be displayed prior to the prompt with the following format:

```
E00: Error message
>
```

00 will contain a 2 digit decimal error code.

5.6 Command argument values

Command arguments are shown in the Help command output surrounded by square brackets '[ARG]' or parenthesis '(ARG)'. Square brackets indicate an optional argument and parenthesis indicate a required

argument. Any optional argument specified requires that all prior optional arguments are also specified.

Argument	Valid Range	Meaning
DEST	1-N	Destination number (N = Count of destinations)
SRC	1-N or 0	Source number (N = Count of sources), 0 acts as mute (if supported).
LEVEL	1-N	Level number (N = Count of system levels)
PRESET	0-9	Preset number (preset 0 is special Startup preset)
IP	D.D.D.D	IP address string argument, specified as 4 decimal digits from 0 to 255 separated by periods.
NETMASK	D.D.D.D	Network mask string argument, specified as 4 decimal digits from 0 to 255. Must be a valid IPv4 netmask.
JSON	string	JSON formatted string, the structure of which depends on the command. The JSON string should be quoted in single quote characters when specifying a JSON value in a command.
LABEL	string	A string label argument, max of 8 characters.
PROFILE	1-N	Profile index number (N = Count of MtxProfiles)
STR	string	A generic string argument (max length depends on the command).

5.7 Error codes

This following table shows possible error codes which may be returned in response to commands.

Error #	Message	Description
E01	Token too long	A command name or string argument was too long.
E02	Invalid command	Invalid command name.
E03	Invalid argument	One or more invalid argument values.
E04	Invalid destination	Invalid matrix destination number.
E05	Invalid source	Invalid matrix source number.
E06	Invalid level	Invalid matrix level number.
E07	Invalid preset	Invalid preset number.
E08	Unterminated string	Double or single quoted string not terminated.
E09	Backspace limit reached	Devices have a limited backspace buffer size, if too many characters are backspaced and then more characters are appended, this error will occur.
E10	HTTP buffer overflow	Only applicable to the web page command interface. Unlimited command input or output can be handled, but not both.
E11	Serial receive overrun	One or more characters were lost on the serial interface.
E12	Unsupported command	Command is not supported by the system or current configuration. Firmware 5.3.0 and newer.

5.8 Basic command reference

Basic commands consist of those commands which are used for modifying routing and other simple commands.

Mascot version where a command was added is indicated in parenthesis, (2.3) for example.

Command	Arguments	Description
Help		Display command help reference.
P *	[PRESET]	Recall a preset.
PAdd *	(PRESET)(DEST)(SRC) [LEVEL]	Add a connection to a preset.
PClr *	(PRESET)	Clear a preset to "No Change" values.
PSub *	(PRESET)(DEST) [LEVEL]	Subtract a connection from a preset.
PView *	[PRESET]	View preset contents.
Quit (2.3)		Quit TCP/IP telnet session.
S *	[1]	Matrix routing status (supplying 1 will display labels).
SysType (2.3)		Query system hardware series.
Vars (2.3)		Query all system configuration variables.
W *	[PRESET]	Store current matrix routing to a preset.
X *	[DEST][SRC][LEVEL]	Perform a matrix connect operation.

* Router systems and MSC-GCP2U32 LCD panel only

5.9 Advanced command reference

These additional commands consist of those which are not as commonly used as the basic commands, such as system configuration commands.

Mascot protocol versions where a command was added is indicated in parenthesis, (2.3) for example.

Command	Arguments	Description
C *		Query system matrix info, which is displayed in the format DESTS,SRCS,LEVELS,FLAGS1,FLAGS2. **MtxCfg command supersedes this command.**
DestNames *	[DEST][LEVEL] [LABEL]	Query or assign destination names.
DHCP	[0 | 1]	Query or assign DHCP enable.
E *	[0 | 1]	Query or assign matrix connection echo enable.
Firmware		Query system firmware version.
FrameIP	[IP]	Remote router IP address the panel will control.

Gateway	[IP]	Query or assign network gateway IP address.
IP	[IP]	Query or assign device system IP address.
LockStatus +		Get video lock status and rate detection information (not all HD router systems are supported).
MAC		Query system MAC address
MascotVer		Query Mascot protocol version.
MtxCfg * (2.0)	[0-7]	Query current matrix config.
MtxGroup + (2.4)	[LVL1][LVL2]	Query or assign I/O grouping.
NetMask	[NETMASK]	Query or assign network mask.
PairIO + (2.1)	[0 | 1]	Query or assign I/O pairing enable (3D support). **MtxGroup supersedes this command.**
PanelDis (2.4)	[0 | 1]	Query or assign internal panel button interface disable.
PanelExtEn (2.4)	[0 | 1]	Query or assign external panel interface enable (if available).
PanelOfs (2.1)	[DEST][SRC] [LVL1][LVL2]	Query or assign button panel destination/source offsets and levels to control. Useful for configuring multiple panels to control different I/O regions of a router.
PanelRate (2.1)	[RATE]	Set remote panel refresh rate in seconds.
PsetNames *	[PRESET][LABEL]	Query or assign preset names.
Reboot		Reboot the system.
ReclkDis + (2.1)	[0 | 1]	Disable SDI reclockers (not all SDI router systems are supported).
RemoteSync + (2.1)	[0 | 1]	Query or assign remote router syncing. Useful for creating a 3D system out of 2 routers.
Sierra + (2.4)	[0 | 1]	Query or assign Sierra Video Systems protocol enable on serial port interface.
SrcNames *	[SRC][LEVEL] [LABEL]	Query or assign source names.
SysName	[STR]	Query or assign system name.
WebPass	(STR)	Assign web password.

* Router systems and MSC-GCP2U32 LCD panel only.
+ Router systems only.

5.10 MSC-GCP2U32 Commands

The MSC-GCP2U32 LCD Panel includes several commands which are not currently part of the standard Mascot command set.

Command	Arguments	Description

DefaultProfile	[INT]	Query or assign the default matrix profile.
DNSPri	[IP]	Query or assign Primary DNS IP address.
DNSSec	[IP]	Query or assign Secondary DNS IP address.
Macros	[JSON]	Query or assign JSON array of macro command strings for M1-M4 buttons.
MtxProfiles	[JSON]	Query or assign JSON array of matrix control profiles.
PanelProfile	[INT]	Query or assign matrix profile for panel control.
Profile	[INT]	Query or assign current matrix profile for Mascot connection.
SerBaud	[BAUD]	Query or assign serial baud rate.
SerProto	[PROTO]	Query or assign serial protocol type (currently unused).
StoreCnt		Query config store count.
SysDescr	[STRING]	Query or assign system description.

5.11 C Command

Routers and MSC-GCP2U32 only

NOTE: Superseded by the MtxCfg Command.

The C command queries the matrix size. The response is in the format "Dests,Srcs,Levels,Flags1,Flags2". Where "Dests" is the count of system destinations, "Srcs" is the count of sources and "Levels" is the number of system levels. The Flags1 and Flags2 fields are currently unused and will be 0.

NOTE: On the MSC-GCP2U32 this command executes within the context of the current matrix profile selected with the Profile Command.

Example for a 16x16 system with 2 levels

```
>C
16,16,2,0,0
>
```

5.12 DefaultProfile Command

MSC-GCP2U32 only

Query or assign the default matrix profile index (starting from 1). This profile is the default active control profile for new Mascot connections. Value is saved and recalled on power up.

Command	Description
DefaultProfile	Query the default profile index.
DefaultProfile PROFILE	Set the default profile index.

Examples

```
>DefaultProfile
1
>DefaultProfile 2
>
```

Query the default profile, which returns 1 (the first profile) followed by assigning 2 to the default profile.

5.13 DestNames Command

Routers and MSC-GCP2U32 only

Query or assign destination names. This command has 4 variations, described by the following table. Destination names are saved and recalled on power up.

NOTE: On the MSC-GCP2U32 this command executes within the context of the current matrix profile selected with the Profile Command.

Command	Description
DestNames	Query all destination names.
DestNames DEST	Query destination names for all levels of a given destination.
DestNames DEST, LEVEL	Query the name of a specific destination and level.
DestNames DEST, LEVEL, LABEL	Assign a label to a destination.

When querying names, labels are surrounded by double quotes and each level is separated by commas ',' (multi-level systems only) and each destination is separated by newlines. Secondary levels use empty strings to indicate that the label of the first level should be used.

Examples
```
>DestNames
"Dest1","AudDest1"
"Dest2",""
"Dest3",""
"Dest4",""
>DestNames 1
"Dest1","AudDest1"
>DestNames 1,2
"AudDest1"
>DestNames 1,2,""
>
```

The first 3 example commands are query commands. The last assigns an empty string to the second level of the first destination (thereby indicating that the first level label should be used).

5.14 DHCP Command

Query or assign DHCP enable. A value of 0 disables DHCP client support and will therefore use the manual values assigned via the IP, Netmask and Gateway commands. A value of 1 enables DHCP and will obtain the values for the IP address, Netmask and Gateway from your DHCP server. This value is saved and recalled on

power up.

WARNING: A DHCP server must be present on your network for this to function properly. Using DHCP allows for dynamic IP or fixed IP assignment from a central location (the DHCP server). Using this option is only recommended if using fixed IP assignment by MAC address or if there is a way to determine what IPs the Matrix Switch Corporation systems get assigned. Otherwise it may become difficult to determine what IP address to use when accessing the Web Page or other control interfaces. In the event that the IP address or Netmask of a system is unknown, consult the Unknown IP Address section for this device.

Command	Description
DHCP	Query DHCP enable.
DHCP 0 | 1	Set DHCP enable (0 to disable, 1 to enable)

Examples to query and then enable DHCP
```
>DHCP
0
>DHCP 1
>
```

5.15 DNSPri Command

MSC-GCP2U32 only

Query or assign the primary DNS server IP address. The value is saved and recalled on power up. Default value is 0.0.0.0 which disables DNS resolution.

NOTE: DNS name resolution is not currently used, so the value of this setting has no effect, future versions of the firmware may utilize it for dynamically resolving host names.

Command	Description
DNSPri	Query primary DNS server IP address.
DNSPri IP	Set primary DNS server IP address.

Examples
```
>DNSPri
0.0.0.0
>DNSPri 192.168.2.1
>
```

Query the primary DNS server IP address, followed by assigning it.

5.16 DNSSec Command

MSC-GCP2U32 only

Query or assign the secondary DNS server IP address. The value is saved and recalled on power up. Default value is 0.0.0.0 which disables this setting.

NOTE: DNS name resolution is not currently used, so the value of this setting has no effect, future versions of the firmware may utilize it for dynamically resolving host names.

Command	Description
DNSSec	Query secondary DNS server IP address.
DNSSec IP	Set secondary DNS server IP address.

Examples
```
>DNSSec
0.0.0.0
>DNSSec 10.0.0.1
>
```

Query the secondary DNS server IP address, followed by assigning it.

5.17 E Command

Routers and MSC-GCP2U32 only

NOTE: On the MSC-GCP2U32 this command executes within the context of the current matrix profile selected with the Profile Command.

Query or assign matrix routing changes echo. A value of 0 disables this feature. A value of 1 will cause all matrix routing changes to be echoed in the form of an X command: "Xd,s[,l]". Where 'd' is the destination number, 's' is the source number and 'l' is the optional level number. This is useful for diagnostic purposes or automation software which would like to receive synchronous matrix routing state updates.

NOTE: Enabling this feature may slow down the system significantly during excessive matrix routing changes (especially when enabled on the serial port). Also of note is that this option takes effect only while the system remains powered (serial port) or for the duration of the connection (TCP/IP telnet sessions). This command is not supported by the HTTP web command interface.

Command	Description
E	Query matrix echo enable.
E 0	1	Set matrix echo enable (0 to disable, 1 to enable).

Examples to query and then enable matrix echo
```
>E
0
>E 1
>
```

5.18 Firmware Command

Query the system firmware version.

Example

```
>Firmware
5.0.6
>
```

5.19 FrameIP Command

Query or assign the remote router IP address. Usually only used on Remote Panel devices or in conjunction with the RemoteSync Command to create a dual router 3D system. Sets the IP address of the Router system which the button panel will connect to and control (or which the router will synchronize to when using the RemoteSync command). This can also be enabled on Router systems with a local button panel to configure the Router's panel to control a different Router (set to 0.0.0.0 by default to disable remote control and control the Router device itself). This setting is saved and recalled on power up.

NOTE: On the MSC-GCP2U32 LCD panel the MtxProfiles Command is a more complete way to assign matrix profiles. The FrameIP Command will add a simple profile with a single router with the given IP address and change the Profile variable to the newly created matrix profile.

Command	Description
FrameIP	Query IP address of remote Router system to control.
FrameIP IP	Set IP address of remote Router system to control (use 0.0.0.0 on Router systems to disable remote control).

Example to query and assign the remote Router IP
```
>FrameIP
192.168.2.60
>FrameIP 192.168.2.61
>
```

5.20 Gateway Command

Query or assign the network Gateway IP address. This is usually only needed on Remote Panel systems which control a Router device on a different network. This setting is saved and recalled on power up.

Command	Description
Gateway	Query IP address of network Gateway.
Gateway IP	Set IP address of network Gateway.

5.21 Help Command

Display command reference information.

5.22 IP Command

Query or assign the system IP address. This setting is saved and recalled on power up.

WARNING: The system IP address should only be changed if one has an understanding of TCP/IP network configuration. Maintaining the ability to access a device's web page and for Remote Panel devices to be able to

communicate with Routers requires that the IP address is known, valid and systems are configured to be on the same IP network. In the event that the IP address of a system is unknown refer to the <u>Unknown IP Address</u> section for this device.

Command	Description
Ip	Query IP address of the system.
Ip IP	Set IP address of the system.

Example querying and assigning the IP address
```
>IP
192.168.2.60
>IP 192.168.2.61
>
```

5.23 LockStatus Command

Routers only

Query the video lock status and video rate of a Video Router's outputs. This command is only supported on some Router systems. Unsupported systems will return an "Unsupported command" error on version 2.1 and newer protocol versions and blank output on older versions.

Command	Description
LockStatus	Displays Video lock status and rate detection for outputs. Format is one decimal number per output (0: Unlocked, 1: SD, 2: HD).

Example for a 16x4 system (SD, HD, Unlocked, Unlocked)
```
>LockStatus
1,2,0,0
>
```

5.24 MAC Command

Query system Ethernet MAC address.

Command	Description
MAC	System Ethernet MAC address in hh:hh:hh:hh:hh:hh where each hh is a pair of hex digits.

Example
```
>MAC
00:50:C2:8B:DF:FE
>
```

5.25 Macros Command

MSC-GCP2U32 only

Query or assign the Mascot commands executed when pressing the **M1-M4** macro buttons. The value is a JSON array of up to 4 Mascot command strings for each macro button. The default macros set the current PanelProfile value to one of the first 4 profiles. The value is stored and recalled on power up.

NOTE: Multiple commands can be executed for a single button by separating them with the command chain character '#'.

Command	Description
Macros	Query macro button commands.
Macros MACROS	Assign macro button commands. MACROS is a JSON array of 4 Mascot command strings for each macro button. Note that the entire JSON string value should be enclosed in single quotes.

Examples
```
>Macros
[ "PanelProfile 1", "PanelProfile 2", "PanelProfile 3", "PanelProfile 4" ]
>Macros '[ "P0","P1","P2","P3" ]'
>
```

The first example is a query for the current Macros which shows the default values (which select the current PanelProfile). The second command assigns Preset Recall commands for the first 4 presets for each macro button.

5.26 MascotVer Command

Query Mascot protocol version. This is useful for software which interacts with a device using the Mascot protocol and wants to discover what protocol version is in use. The returned value is either an integer such as "2" or major and minor version numbers separated by a period, such as "2.3".

Example
```
>MascotVer
2.3
>
```

5.27 MtxCfg Command

Routers and MSC-GCP2U32 only - Protocol Version: 2.0

NOTE: On the MSC-GCP2U32 this command executes within the context of the current matrix profile selected with the Profile Command.

Query matrix configuration. This command replaces the C command and provides the ability to query the matrix dimensions, labels, current matrix state and preset data. The information to return is specified by the sum of the flags values listed in the following table:

Flag	Information	Fields in JSON data
1	Return names (Destination, Source and Preset).	destNames, srcNames and psetNames

2	Return matrix routing state.	state
4	Return preset routing data.	psetData

The returned data is JSON formatted data (see www.json.org for details).

If no arguments are specified then a simple format is returned consisting of an array of arrays (one per level) with 3 integer numbers specifying the destination count, source count and flags of the level. The flags value is the sum of one or more values from the Flags table below.

Flags

Name	Value	Description
mute	1	Mute support.
lock	2	Video lock status query support
reclk	4	Reclocker disable support.

Example
```
>MtxCfg
[[8,8,3][4,8,0]]
```

The example above is simple output (no arguments) for a matrix with 2 levels, the first has 8 destinations, 8 sources and supports mute and lock status query (1 + 2 = 3). The second level has 4 destinations, 8 sources and does not support mute, lock status query or reclocker disable.

If an argument is specified (0-7), then a more descriptive JSON structure is returned, of the following form (newlines and spaces added as a visual aid, but are not necessarily part of the response):

```
{
  "version" : 1,
  "status" : "STATUS",
  "levels" :
  [
    {
      "name" : "NAME",
      "type" : "TYPE",
      "destCount" : DEST_COUNT,
      "srcCount" : SRC_COUNT,
      "flags" : "FLAGS",
      "destNames" : [ "NAME", "NAME", ... ],
      "srcNames" : [ "NAME", "NAME", ... ],
      "state" : [ SRC, SRC, ... ],
      "psetData" : [ [ SRC, ... ], [ SRC, ... ], ... ]
    },
    ...
  ],
  "psetNames" : [ "NAME", "NAME", ... ]
}
```

Table of information on values in capital letters above:

Label	Description
STATUS	Matrix status: OK, UPDATING, DISCONNECT or ERROR. Returned if the matrix is OK, updating (from a remote router for example), one or more remote routers disconnected or a general error (remote router in error status for example) respectively.
NAME	Descriptive name of a level, destination, source or preset (8 chars or less).
TYPE	Level type: VIDEO, AUDIO, HD, VGA, 3G, ANALOG or AES. Used for general video, general audio, HD video, VGA video, 3G HD video, analog audio or AES digital audio respectively.
DEST_COUNT	Count of destinations for the level.
SRC_COUNT	Count of sources for the level.
FLAGS	A space separated list of flag keywords indicating support for various features, as defined by the Name column in the Flags table above.
SRC	Source values for matrix state and preset data. Values start from 1, 0 represents mute and -1 represents "No Change" (for preset data only).

Example - Newlines and spaces added to response as a visual aid.

```
>MtxCfg7
{
  "version" : 1,
  "status" : "OK",
  "levels" :
  [
    {
      "name" : "Level1",
      "type" : "VIDEO",
      "destCount" : 4,
      "srcCount" : 4,
      "flags" : "mute",
      "destNames" : [ "Dest1", "Dest2", "Dest3", "Dest4" ],
      "srcNames" : [ "Src1", "Src2", "Src3", "Src4" ],
      "state" : [ 1, 2, 3, 4 ],
      "psetData" :
      [
        [1,2,3,4], [1,1,1,1], [-1,-1,-1,-1], [-1,-1,-1,-1],
        [-1,-1,-1,-1], [-1,-1,-1,-1], [-1,-1,-1,-1], [-1,-1,-1,-1],
        [-1,-1,-1,-1], [-1,-1,-1,-1]
      ]
    },
  ],
  "psetNames" :
  [
    "Startup","Preset1","Preset2","Preset3","Preset4",
    "Preset5","Preset6","Preset7","Preset8","Preset9"
  ]
}
```

The example output above is a typical response for a 4x4 Video router. Current matrix routing is "straight through", 10 presets are defined (1st is straight through, 2nd is mapped all to source 1, and all other presets have not been assigned (No Change). Note that future protocol versions may support more than 10 presets and therefore may return information for more or less than 10 presets for the psetData and psetNames arrays.

5.28 MtxGroup Command

Carina Series routers only - Protocol Version: 2.4

Query or assign I/O grouping. This setting is saved and recalled on power up.

The I/O grouping feature is used to combine multiple inputs and outputs. Combined grouped inputs and outputs then behave as if they were a single I/O, which changes the size of the router matrix accordingly (matrix size divided by group count), and matrix routing changes update the grouped I/Os simultanously. Group counts are assigned on a per level basis, allowing for different I/O grouping for separate levels (for example separate video and audio levels). Real world examples of I/O grouping include: dual channel 3D video and combining multiple audio channels (4 AES digital audio streams for example).

Command	Description
MtxGroup	Query current I/O grouping.
MtxGroup LEVEL1	Set level 1 I/O grouping (0 or 1 disables grouping).
MtxGroup LEVEL1, LEVEL2	Set level 1 and level 2 I/O grouping (0 or 1 disables grouping).

Example querying and assigning I/O grouping
```
>MtxGroup
1,1
>MtxGroup 2,4
>MtxGroup
2,4
>
```

The first example MtxGroup command shows that I/O grouping is disabled on both levels of a 2 level system. The second command configures the system for dual I/O grouping on level 1 and quad I/O grouping on level 2. On an example 16x16 two level router this would result in an 8x8 matrix on level 1 and a 4x4 matrix on level 2.

5.29 MtxProfiles Command

MSC-GCP2U32 only

Query or assign the matrix routing profiles which the panel controls. The value consists of a JSON array of Virtual Matrix definitions, which define the routers which are controlled. The default value is a simple profile which controls all levels of a single router at the IP address 192.168.2.60. Value is stored and recalled on power up. Refer to the Virtual Routing section for more details.

Command	Description
MtxProfiles	Query the matrix profiles, note that additional JSON object fields are present when querying (compared to values used during assignment),

	which indicate the current status of each profile and the version the data conforms to.
MtxProfiles PROFILES	Assign to the matrix profiles. Value is a JSON array of Virtual Matrix object definitions, refer to Virtual Routing for more details of this format.

Examples

```
>MtxProfiles
[
  {
    "version": 1,
    "status": "UPDATING",
    "name": "192.168.2.60",
    "routers": [ "192.168.2.60" ]
  }
]
>MtxProfiles '[ { "name": "Router1", "routers": [ "192.168.2.60" ] }, { "name":
"Router2", "routers": [ "192.168.2.61" ] } ]'
>
```

The first example is a query of the matrix profiles, which shows the default value which is a single profile that controls a router at the IP address 192.168.2.60. The second example command assigns two profiles, the first controls the all levels of the router at 192.168.2.60 and the second controls all levels of the router at 192.168.2.61.

5.30 NetMask Command

Query or assign the system network mask value. This value is related to the IP address of the system and is used for IP communications over the Ethernet network. This setting is saved and recalled on power up.

WARNING: The system netmask should only be changed if one has an understanding of TCP/IP network configuration. Maintaining the ability to access a device's web page and for Remote Panel devices to be able to communicate with Routers requires that the IP address is known, valid and systems are configured to be on the same IP network. In the event that the IP address or Netmask of a system is unknown, consult the Unknown IP Address section for this device.

Command	Description
NetMask	Query network mask value.
NetMask NETMASK	Set network mask value.

Example querying and assigning netmask

```
>NetMask
255.255.255.0
>NetMask 255.255.255.192
>
```

5.31 P Command

Routers and MSC-GCP2U32 only

NOTE: On the MSC-GCP2U32 this command executes within the context of the current matrix profile selected with the Profile Command.

Recalls a preset. Each Router system contains 10 presets numbered 0 through 9 which can store the entire matrix routing state or one or more single destination connections. Preset 0 is recalled on system power up.

Command	Description
P PRESET	Recall a preset.

Example to recall preset 1
```
>P 1
>
```

5.32 PAdd Command

Routers and MSC-GCP2U32 only

NOTE: On the MSC-GCP2U32 this command executes within the context of the current matrix profile selected with the Profile Command.

Preset add command. Adds a connection to a preset. This can be used to incrementally create a preset without changing the active matrix routing. 0 can be used for SRC for Mute (if supported). This command stores preset information which is retained and available through system power cycles.

Command	Description
PAdd PRESET, DEST, SRC	Add a connection of SRC to DEST on PRESET for all levels.
PAdd PRESET, DEST, SRC, LEVEL	Add a connection of SRC to DEST/LEVEL on PRESET.

Example
```
>PAdd 1,2,3
>PAdd 1,3,0,2
>
```

The first command adds a connection from Source 3 to Destination 2 on Preset 1. The second command Mutes Destination 3/Level 2 on Preset 1.

5.33 PairIO Command

Routers only - Protocol Version: 2.1

NOTE: Superseded by MtxGroup command.

I/O pairing is used for pairing destinations/sources for 3D support. When activated a router will appear to have half the number of physical destinations and sources. A given matrix crosspoint change will cause 2 destinations to be changed. Each odd destination/source is paired with the next highest even number destination/source. This option is stored and recalled on power on. When enabling this feature on a 4x4 video

router for example, it would appear as a 2x2 3D router where destination 1 & 2 are paired and 3 & 4 are paired, likewise for sources. This setting is stored and recalled on power up.

Command	Description
PairIO	Query current value of I/O pairing configuration.
PairIO 0	1	Enable or disable I/O pairing (0: disable, 1: enable)

Example
```
>PairIO
0
>PairIO 1
>
```

The first command queries the current state of I/O pairing, the second enables it.

5.34 PanelOfs Command

Carina series only - Protocol Version: 2.1

Define destination/source regions or assign media levels which a remote panel controls. This is typically used to configure multiple remote panels to control portions of a video/audio router. For example, two 8x8 remote panels could be used to control separate halves of an 8x16 router, the first would control the default destination 1-8 and the second would be configured using this command to control destination 9-16 (a destination offset of 9). Another useful configuration would be to configure one remote panel to control video only and another to control audio only of a video/audio router by assigning primary level values of 1 and 2 respectively using this command. This setting is stored and recalled on power up.

Command	Description
PanelOfs	Query current panel offset settings, 4 values are returned separated by commas, corresponding to the same values which are assigned.
PanelOfs DESTOFS, SRCOFS, LVL1, LVL2	Assign panel destination/source offsets and level control values.

The DESTOFS parameter assigns a destination offset that determines which destination the button panel starts on, 0 is used for no offset (default). The SRCOFS parameter is used likewise to assign a source offset. The LVL1 and LVL2 parameters are used for modifying what levels the panel will control. The default is 0 for both values which uses the default levels of 1 and 2 for the primary and secondary levels respectively. If LVL1 is assigned a value other than 0 and LVL2 is 0 then the secondary level control will be disabled.

Examples
```
>PanelOfs
0,0,0,0
>PanelOfs 1,0,0,0
>PanelOfs 0,0,2,0
```

```
>
```

The first command just queries the current panel offset values, which returns all 0s (the default). The second command assigns 1,0,0,0 which sets a destination offset of 1, which will set the first destination of the button panel to destination 2. The third command sets up a button panel to control the 2nd level of a router.

5.35 PanelDis Command

Carina series only - Protocol Version: 2.4

Query or assign internal button interface panel disable setting. This setting is stored and recalled on power up.

Command	Description
PanelDis	Query internal panel disable setting.
PanelDis 0 | 1	Assign internal panel disable setting (0: enable, 1: disable)

Examples
```
>PanelDis
0
>PanelDis 1
>
```

The first command queries the current panel disable setting (0: enabled). The second command disables the internal panel interface.

5.36 PanelExtEn Command

Carina series only - Protocol Version: 2.4

Query or assign external button interface panel enable setting (if applicable – not all router devices have an external panel interface). This setting is stored and recalled on power up.

Command	Description
PanelExtEn	Query external panel interface enable setting.
PanelExtEn 0 | 1	Assign external panel interface enable setting (0: disable, 0: enable)

Examples
```
>PanelExtEn
0
>PanelExtEn 1
>
```

The first command queries the current external panel interface setting (0: disabled). The second command enables the external panel interface.

5.37 PanelProfile Command

MSC-GCP2U32 only

Query or assign the current active panel matrix profile index. This is the current matrix profile that the LCD panel interface is controlling (refer to the MtxProfiles Command for details).

Command	Description
PanelProfile	Query the current panel matrix profile index.
PanelProfile PROFILE	Set the current panel matrix profile index being controlled.

Examples
```
>PanelProfile
1
>PanelProfile 2
>
```

The first example command queries the current value of the panel matrix profile index and the second command switches the panel to control the second profile.

5.38 PanelRate Command

Protocol Version: 2.1

For changing remote button panel refresh rate. When a button panel is configured to control a remote router the current connection status is refreshed at regular intervals. This command can be used to increase or decrease the rate, which is saved and recalled on system power up. The default refresh rate is 5 seconds. This value is stored and recalled on power up.

Command	Description
PanelRate	Query current panel refresh rate (in seconds).
PanelRate RATE	Set remote panel refresh rate in seconds.

Examples
```
>PanelRate
5
>PanelRate 1
>
```

The first command queries the current panel refresh rate, which returns 5 (default). The second command sets the refresh rate to be 1 second.

5.39 PClr Command

Routers and MSC-GCP2U32 only

NOTE: On the MSC-GCP2U32 this command executes within the context of the current matrix profile selected with the Profile Command.

Clear a preset. For Preset 0 this sets all Destinations to Source 0. Other Presets are assigned "No Change" to

all Destinations. This command stores preset information which is available through system power cycles.

Command	Description
PClr PRESET	Clear a preset.

Example to clear preset 1
```
>PClr 1
>
```

5.40 Profile Command

MSC-GCP2U32 only

Query or assign the current matrix profile index (starting from 1) of a Mascot connection. This variable is individually kept for each Mascot command connection (TCP/IP or serial) and each connection is initially assigned the value from DefaultProfile. Other router related Mascot commands are executed within the context of the current active matrix profile.

Command	Description
Profile	Query the current active matrix profile of the Mascot connection.
Profile PROFILE	Set the current active matrix profile of the Mascot connection.

Examples
```
>Profile
1
>Profile 2
>
```

The first example command queries the value of the current active matrix profile and the second command sets the active profile to the second one in the MtxProfiles array.

5.41 PsetNames Command

Routers and MSC-GCP2U32 only

NOTE: On the MSC-GCP2U32 this command executes within the context of the current matrix profile selected with the Profile Command.

Query or assign preset names. Preset names are stored and recalled on power up.

Command	Description
PsetNames	Query all preset names.
PsetNames PRESET	Query a single preset name.
PsetNames PRESET, LABEL	Assign a preset label.

When querying names, labels are surrounded by double quotes and separated by newlines.

Examples

```
>PsetNames
"Startup"
"Preset1"
"Preset2"
"Preset3"
"Preset4"
"Preset5"
"Preset6"
"Preset7"
"Preset8"
"Preset9"
>PsetNames 1
"Preset1"
>PsetNames 1,"MyPreset"
>
```

The first 2 example commands are query commands. The last assigns "MyPreset" to Preset 1.

5.42 PSub Command

Routers and MSC-GCP2U32 only

NOTE: On the MSC-GCP2U32 this command executes within the context of the current matrix profile selected with the Profile Command.

Preset subtract command. Removes a connection in a preset by setting a Destination or Destination/Level to "No Change". This can be used to incrementally create a preset without changing the active matrix routing. This command changes preset data which is stored and persists through power cycles.

Command	Description
PSub PRESET, DEST	Remove any existing connection to DEST in PRESET for any level.
PSub PRESET, DEST, LEVEL	Remove any existing connection to DEST/LEVEL in PRESET.

Example

```
>PSub 1,2
>PSub 1,3,2
>
```

The first command removes any connection to Destination 2 in Preset 1. The second command removes any connection to Destination 3/Level 2 on Preset 1.

5.43 PView Command

Routers and MSC-GCP2U32 only

NOTE: On the MSC-GCP2U32 this command executes within the context of the current matrix profile selected with the Profile Command.

View presets. Displays the content of one or all presets.
The format of the returned output is "1:S1[,S2] 2:S1[,S2] ..." where the 1: and 2: are incrementing destination values, followed by one or more source values (depending on the number of system levels).

Special source values
- '-' indicates "No Change", which causes no changes to the given Destination/Level.
- 0 indicates "Mute"

Command	Description
PView	Display all presets.
PView PRESET	Display a single PRESET.

Example on a 16x4 system with 2 levels
```
>PView 1
1:1,1 2:2,2 3:6,7 4:0,-
>
```

The above example shows that Preset 1 would cause Destination 1 to be connected to Source 1 for both levels, Destination 2 to be connected to Source 2 for both levels, Destination 3 to be connected to Source 6 for Level 1 and Source 7 for Level 2 (break away) and Destination 4 to be Muted for Level 1 and "No Change" would be made for Level 2.

5.44 Quit Command

MSC-GCP2U32 only

Closes the current Mascot TCP/IP connection. Only applicable to persistent TCP/IP Mascot client connections, such as telnet.

Command	Description
Quit	Close the current TCP/IP connection (if applicable).

Examples
```
>Quit
<Connection closed>
```

5.45 Reboot Command

Instructs the system to reboot, which is done after a brief delay.

5.46 ReclkDis Command

Routers only - Protocol Version: 2.1

Command for disabling or enabling SDI reclockers. Not all router systems support this option. Value is saved and recalled on power up.

Command	Description
ReclkDis	Query current value of reclocker disable.
ReclkDis 0 | 1	Enable or disable reclockers (0 or 1 respectively).

Examples

```
>ReclkDis
0
>ReclkDis 1
>
```

The first command above queries the current reclocker disable value which returns 0 (the default, reclockers enabled). The second command disables the reclockers.

5.47 RemoteSync Command

Routers only - Protocol Version: 2.1

Command to enable syncing matrices of two router systems. Usually used for creating a 3D matrix from two router systems, which will result in one router controlling the left 3D channels and the other router controlling the right channels. When enabled, this option synchronizes matrix crosspoint changes to the router IP address assigned with the FrameIP Command. This command should only be enabled with one of the two routers (the primary router). This value is stored and recalled on power up.

Command	Description
RemoteSync	Query current value of remote router syncing.
RemoteSync 0 | 1	Enable or disable remote router syncing (1 or 0 respectively).

Examples

```
>RemoteSync
0
>RemoteSync 1
>FrameIP 192.168.2.61
>
```

The first command in the above examples queries the current value of the remote sync option, which returns 0 (disabled, the default). The second command enables remote syncing and the final command sets the IP address of the router to sync (secondary router).

5.48 S Command

Routers and MSC-GCP2U32 only

NOTE: On the MSC-GCP2U32 this command executes within the context of the current matrix profile selected with the Profile Command.

Query the current matrix routing state. Source values for all levels of every destination are shown. This

command without an argument is equivalent to the X Command with no arguments. If an argument value of '1' is supplied, then the matrix state is displayed with labels. The state of each destination is displayed, one per line, in the format:
"DestNLvl1":"SrcLvl1","DestNLvl2":"SrcLvl2",...

Example

```
>S1
"Dest1":"Src4","Dest1":"Src4"
"Dest2":"Src3","Dest2":"Src3"
"Dest3":"Src2","Dest3":"Src2"
"Dest4":"Src1","Dest4":"Src4"
```

The example above is output from a two level (Video and Audio for example) 4x4 matrix with sources routed in reverse order, except destination 4, which has a 2nd level break away which is routed from source 4.

5.49 SerBaud Command

MSC-GCP2U32 only

Query or assign the serial port baud rate. The default value is 115200. This value is stored and recalled on power up.

Command	Description
SerBaud	Query the current serial port baud rate.
SerBaud BAUD	Set the serial port baud rate.

Examples

```
>SerBaud
115200
>SerBaud 9600
>
```

The first example command queries the serial baud rate value which is the default of 115200 and the second command sets it to 9600 baud.

5.50 SerProto Command

MSC-GCP2U32 only

Query or assign the serial protocol. The only available option is currently the case insensitive value "Mascot", however additional control protocols may be added in the future. Value is stored and recalled on power up.

Command	Description
SerProto	Query the protocol used on the serial port.
SerProto PROTO	Assign the protocol used on the serial port (the only valid value is currently "Mascot").

Examples

```
>SerProto
Mascot
>
```

5.51 Sierra Command

Carina Series routers only - Protocol Version: 2.4

Queries or assigns Sierra Video Systems protocol on serial port. This setting is stored and recalled on power up.

Command	Description
Sierra	Query Sierra Video Systems protocol enable on serial port.
Sierra 0 | 1	Assign Sierra Video Systems protocol enable (0: Disable – use MASCOT protocol, 1: Enable)

Examples
```
>Sierra
0
>Sierra 1
>
```

The first command above queries the current value of the Sierra Video Systems protocol enable (0 = disabled, using MASCOT protocol). The second command enables the Sierra Video Systems protocol on the serial port.

5.52 SrcNames Command

Routers and MSC-GCP2U32 only

NOTE: On the MSC-GCP2U32 this command executes within the context of the current matrix profile selected with the Profile Command.

Query or assign source names. This command has 4 variations, described by the following table. Source names are stored and recalled on power up.

Command	Description
SrcNames	Query all source names.
SrcNames SRC	Query source names for all levels of a given source.
SrcNames SRC, LEVEL	Query the name of a specific source and level.
SrcNames SRC, LEVEL, LABEL	Assign a label to a source.

When querying names, labels are surrounded by double quotes and each level is separated by commas ',' (multi-level systems only) and each source is separated by newlines. Secondary levels use empty strings to indicate that the label of the first level should be used.

Examples
```
>SrcNames
```

```
"Src1","AudSrc1"
"Src2",""
"Src3",""
"Src4",""
>SrcNames 1
"Src1","AudSrc1"
>SrcNames 1,2
"AudSrc1"
>SrcNames 1,2,""
>
```

The first 3 example commands are query commands. The last assigns an empty string to the second level of the first source (thereby indicating that the first level label should be used).

5.53 StoreCnt Command

MSC-GCP2U32 only

Query the configuration storage count. This is the number of times the system configuration has been stored to FLASH memory.

Command	Description
StoreCnt	Query the configuration storage count.

Examples

```
>StoreCnt
215
>
```

5.54 SysDescr Command

MSC-GCP2U32 only

Query or assign the system description. This field provides a more detailed field to describe the system than the SysName variable. The default is blank. This value is stored and recalled on power up.

Command	Description
SysDescr	Query the system description string.
SysDescr STRING	Set the system description string.

Examples

```
>SysDescr

>SysDescr "The main SDI video router"
>
```

The first command queries the system description, which returns the default blank value and the second command assigns a system description string.

5.55 SysName Command

Query or assign system name. The system name is provided for convenience when managing multiple Matrix Switch Corporation systems. This value is stored and recalled on power up.

Command	Description
SysName	Query system name.
SysName STR	Set system name (up to 15 characters).

Example for querying and assigning system name
```
>SysName
MSC-Router
>SysName "MyRouter"
>
```

5.56 SysType Command

Protocol Version: 2.3

Query the system series type, which is currently defined as one of the following values:

Value	Series name
0	Carina
1	Lupus
2	Lynx
3	Hydra

NOTE: This command was not added until version 2.3 of the Mascot protocol. On previous versions, this command is available on the MSC-GCP2U32 LCD panel but not other Matrix Switch Corporation systems. When determining the system type, if executing the command returns an Invalid Command error, the system series can be assumed to be Carina.

Command	Description
SysType	Query the system hardware series.

Examples
```
>SysType
E01: Invalid command
>SysType
2
>
```

The first example command shows the response that would be received on a Carina series system with older firmware not supporting the SysType command, the second example is what might be returned by an MSC-GCP2U32 LCD panel.

5.57 Vars Command

Protocol Version: 2.3

Display all system configuration variables. Useful in serial terminal or telnet sessions to view all configuration values.

Command	Description
Vars	Display all system configuration parameters. Note that variables consisting of JSON data simply show the string JSON, to keep the output concise. The output consists of one line per variable, with the variable name followed by an equals '=' and then the value (not quoted).

Examples

```
>Vars
DefaultProfile=1
DHCP=1
DNSPri=0.0.0.0
DNSSec=0.0.0.0
Firmware=1.5.1
Gateway=192.168.2.1
IP=192.168.2.80
Mac=00:00:00:00:00:00
MascotVer=2
MtxProfiles=JSON
Netmask=255.255.255.0
Profile=1
SerBaud=115200
SerProto=Mascot
SysName=MSC-Panel
SysType=2
>
```

The example above shows a typical output of the Vars command for an MSC-GCP2U32 LCD panel.

5.58 W Command

Routers and MSC-GCP2U32 only

NOTE: On the MSC-GCP2U32 this command executes within the context of the current matrix profile selected with the Profile Command.

Write current matrix routing state to a preset. Recalling the preset later will restore the routing matrix to the same state. This command modifies preset data which persists through power cycles.

Command	Description
W PRESET	Write current matrix routing state to PRESET.

Example to save state to preset 1

```
>W 1
>
```

5.59 WebPass Command

Assign a web password to password protect the web page interface. The serial and TCP/IP port Mascot protocol control is not protected by this password. This value is stored and recalled on power up.

Command	Description
WebPass STR	Set web page password (blank to disable)

Examples of setting and clearing web page password
```
>WebPass SeCr3t
>WebPass ""
>
```

5.60 X Command

Routers and MSC-GCP2U32 only

NOTE: On the MSC-GCP2U32 this command executes within the context of the current matrix profile selected with the Profile Command.

Query or make changes to the matrix routing state. This command comes in several variations described by the following table.

Command	Description
X	Query complete routing state (equivalent to S Command).
X DEST	Query connected sources for DEST for all levels.
X DEST, SRC	Connect SRC to DEST for all levels.
X DEST, SRC, LEVEL	Connect SRC to DEST/LEVEL.

When querying connection state, sources for each level are separated by commas (multi-level systems only) and are displayed for each destination and separated by newlines.

The value 0 can be used for DEST to switch all destinations to a given source. A level may also be specified to isolate switching a single level of all destinations. **(Protocol Version 2.2)**

The value 0 can be used for SRC to Mute a destination (if supported for a given level).

Examples
```
>X
1,1
2,2
3,8
0,4
```

```
>X 3
3,8
>X 3,4
>X 4,0,2
>
```

In the above examples the first command queries the matrix routing state (typical of a 16x4 system for example), the second command queries destination 3 only, the third command connects source 4 to destination 3 on all levels and the fourth command mutes destination 4 level 2.

Command stacking
Command stacking is especially useful for the X command, since it allows for several connections to be performed at the same time.

Example
```
>X1,4#X2,3#X3,2#X4,1
>
```

The above would connect source 4 to destination 1, source 3 to destination 2, source 2 to destination 3 and source 1 to destination 4 for all levels.

6 Software Updates

The procedure for updating software (also called firmware) on Matrix Switch Corporation devices is determined by the hardware series. It is recommended that software updates are only performed in order to resolve an issue or gain a desired feature. While the software update procedures have been designed to be resistant to failure, there is still a risk of a device becoming inoperable in the event that an update is interrupted.

6.1 Software Update on Lupus and Lynx Series Devices

Once a valid software update image is obtained from Matrix Switch Corporation for the applicable hardware series, the following procedure can be used to perform a software update.

1. Connect to the device's web page interface using a web browser on a computer connected to the same Ethernet network and with an IP address on the same subnet as the device.

2. Navigate to the Software Update section of the web page.

3. Click the Browse button and locate and select the desired firmware image.

4. Click the Update button and wait for up to 30 seconds for a success message to be displayed.

5. Reboot the device by clicking the Reboot button on the web page interface or power cycling it.

7 Troubleshooting

This section contains information on frequent issues and ways to troubleshoot them.

7.1 Unknown IP address

In the event that the IP address of a device is unknown, the following procedure can be used to retrieve it:

The IP address of the LCD panel device can be viewed and changed using the LCD panel interface. Refer to the Network Config section for details.

7.2 Unexpected reboots

If the device is rebooting unexpectedly (detectable on routers when the routing state gets reset to preset 0), make sure the correct power supply is being used with the device (5 Volt 2 Amp).

7.3 Device fails to startup – Failsafe boot instructions

In the event that a software update is interrupted or other system data corruption occurs, the MSC-GCP2U32 may not startup. This device comes with a backup version of the system software, which can be used to repair a broken system by doing a software update.

Failsafe startup instructions

1. Connect a serial cable to a computer with an RS-232 serial port (or use a USB to serial adapter if the computer is not natively equipped with one) using a D9 female to female straight through cable.

2. Start up a serial terminal application (such as Hyperterminal on Microsoft Windows systems) and configure it for the proper serial hardware port and the serial settings 115200 Baud, 8N1.

3. Power up the MSC-GCP2U32 device (or power cycle it if it is already running).

4. After a few seconds the serial console should display the u-boot boot loader startup sequence and prompt to press a key to enter u-boot shell.

5. Press a key (such as the space bar) to go to the u-boot shell. If the prompt goes by too fast, power cycle again and press a key within the short time window when prompted, until the serial console shows the u-boot prompt.

6. Type the following command to boot the failsafe software image

```
run failsafe
```

The device should boot successfully and allow for a software update in order to repair a broken system. After performing a software update, reboot and allow the device to startup normally. System should now be working again. Please contact Matrix Switch Corporation if you need any assistance with this procedure or if it fails to repair the system.

8 Reference

8.1 Glossary

- **Active Routing** – The current routing state of a Router's Matrix.
- **Destination** – A Video or Audio destination (output from a Router device). Numbered starting from 1.
- **Input** – Synonymous with Source.
- **IP** – Stands for Internet Protocol. Base protocol of the Internet which can also be used on LANs. This protocol uses 4 byte addresses (IPv4) written in "quad dot" format, which is four decimal numbers separated by periods (192.168.2.60 for example).
- **LAN** – Stands for Local Area Network. Refers to a single local Ethernet network, usually consisting of a single IP subnet.
- **Level** – Router devices may contain multiple Video and Audio levels. Level numbers start from 1.
- **Mascot Protocol** – An abbreviation of **MA**trix **S**witch **CO**rporation pro**T**ocol. An ASCII text based protocol for interfacing to Matrix Switch Corporation devices.
- **Matrix** – Used when referring to a Router's entire routing state.
- **Mute** – When supported, a destination can be muted, which for video means the output is turned off and for audio means it is silenced.
- **Output** – Synonymous with Destination.
- **Preset** – Matrix Switch Corporation Router devices provide 10 presets which store matrix Routing connections. When a preset is "recalled" zero or more matrix connections are changed based on the content of the Preset. Numbered starting from 0. Preset 0 is special in that it is recalled on system startup.
- **Remote Panel** – Matrix Switch Corporation Remote Panels connect to Router devices for remote control with touch buttons.
- **Router** – A Video/Audio Routing device routes one or more sources to one or more destinations (not to be confused with a Network router, which is referred to as a Network Switch in this manual).
- **Simple Panel** – A Matrix Switch Corporation Remote Panel which has buttons only.
- **Smart Panel** – A Matrix Switch Corporation Remote Panel which comes equipped with an LCD screen interface.
- **Source** – A Video or Audio source (input to a Router device). Numbered starting from 1.
- **TCP** – Stands for Transport Control Protocol. This protocol is used by Matrix Switch Corporation devices for remote panel control, the MASCOT network interface and the web page interface.

9 Matrix Switch Corporation Warranty

MSC provides the following limited warranty with its products:

1. MSC warrants that the equipment it manufactures is free from defects in material and workmanship.

2. This warranty begins on the day the product is shipped from MSC and shall be in effect for two years.

3. If the product is found to be defective, MSC shall at its option:
   a) Provide free replacement parts.
   b) Repair the unit at MSC's facilities.
   c) Repair the unit at the customer's location.
   d) Exchange the product for a product of the same type.
MSC shall make every reasonable effort to support critical emergencies by supplying no-cost loan equipment while the defective unit is being repaired.

4. Customer bears the cost of shipping products returned to MSC under this warranty; however, MSC shall bear the cost of shipping repaired products or replacement parts to the customer.

5. Any customer returning a product for repair shall first obtain from MSC a Return Material Authorization (RMA) number which shall be placed on the outside of the shipping package.

6. This warranty does not apply if the product has been damaged by accident, abuse, misuse, misapplication or modification.

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To the extent this warranty conflicts with local law, local law shall only apply to such conflict.

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