MAGENTA

VOYAGER

VG-Matrix 160, VG-Matrix 48
VG-TX2, VG-TX4
VG-RX2, VG-RX4

Serial Protocol User's Guide

Document # 5310287-01-01 (11/2/2012)

Magenta Research, Ltd.
128 Litchfield Road
New Milford, CT 06776 USA

Precautions

Safety Instructions • English

This symbol is intended to alert the user of important maintenance (servicing) and operating information.

This symbol is intended to alert the user to the presence of un-insulated dangerous voltages or other conditions in or around the product enclosure which may present a risk of electric shock, damage to equipment or facilities.

This symbol is intended to alert the user of potentially dangerous invisible laser radiation.

Caution:

Read instructions: Read and understand all operating, installation and safety instructions before using this equipment.

Avoid Attachments: Do not use accessories, attachments, tools or materials that are not recommended by the equipment manufacturer. Doing so may compromise operating performance, create an unsafe condition, damage equipment, or violate the terms of usage or warranty.

Follow Warnings: Always follow all instructions and warnings marked on the equipment, or as detailed in the related user documentations.

Contact Information

For sales or technical support, contact your nearest Magenta Research sales office.

REGION	CONTACT DETAILS
North, Central and South Americas: Magenta Research, LTD Corporate Headquarters 128 Litchfield Road New Milford, CT 06776 USA	Main: 800-805-0944 (USA only) or +1 860-210-0546 Fax: 1-860-210-1758 Web: www.magenta-research.com Sales: sales@magenta-research.com Support: techsupport@magenta-research.com Sales/Support phone hours: 7:00-19:00 (EST: GMT-0500)
Asia: Magenta Research Asia Limited Unit 1 21/F Cheung Tat Centre Chai Wan, Hong Kong	Main: 852.3105.1493 Fax: 852.3105.1491 Contact: awaung@magentaresearch-asia.com Sales: awaung@magentaresearch-asia.com
Pan European Office (includes Japan, Australia, etc.): Magenta Research, LTD	Main: +44 7708-850582 Contact: rmuddiman@magenta-research.com Sales: sales@magenta-research.com
For all RMA return shipments, use this address unless you are advised otherwise: Magenta Research, LTD RMA Department 128 Litchfield Road New Milford, CT 06776 USA	Prior to returning any products, please contact Magenta's support line to obtain an RMA number. This RMA number is essential for tracking your returns and for ensuring they are processed in a timely manner. Support Phone: 800-805-0944 (USA only) or +1 860-210-0546 Support e-mail: techsupport@magenta-research.com Support phone hours: 7:00-19:00 (EST: GMT-0500)

Contents

About this Manual 1
Product Overview 2
Voyager Matrix Control Overview 2
Voyager Matrix Internal Block Diagram 3
Voyager Matrix Serial Interface 4
Character Abbreviations 4
Voyager Matrix Physical Description 5
Voyager Matrix Slot Assignments 5
VG-Matrix 48 Front Panel View 6
VG-Matrix 48 Rear Panel View 7
VG-Matrix 160 Front Panel View 8
VG-Matrix 160 Rear Panel View 9
Voyager Matrix Control Port Designation 10
System Power & Thermal Management 11
Voyager Matrix Command Overview 12
Command Execution 12
Command Format 13
Switch “input” and “output” ports and numbering 14
Standard Command Responses 15
Extended Response Format 15
Unsolicited Responses 16
Power-up Reset String 17
Power-down String 17
Power-down Methods 18
Power-down Sequence 19
Voyager Matrix: General Commands 20
%RE – Read Last Error 20
%ST - System Temperature Report 21
%SI - System Initialization 22
System Geometry 23

%SG0 - System Geometry General Information 23
%SG1 - System Geometry Port Info 23
%SG3 - System Geometry I/O Card Presence 24
Device Information 24
%D10 – Device Information Switch Information 24
%DI1 – Device Information Version Numbers 25
%DI2 – Device Information: IO Cards Version Numbers 25
%DG – Diagnostic Information 26
%DG0 – System Voltages Report 26
%DG1 – Power Supply Status Report 27
%DG2 – Fan Status Report 27
%DG3 – Air-filter Status Report 28
%DG4 – Alarm Conditions Report 28
%DG5 – I/O Card Power Supply Status Report 29
System Configuration Settings 30
%SC – System Configuration Settings (Read Setting) 30
%SC – System Configuration Settings (Write Setting) 30
System Configuration Item Codes 31
%XX – Cross-point Map Clear 36
%XD - Cross-point Map Display 37
%XO - Cross-point Map Display: Query by Output 38
%XI - Cross-point Map Display: Query by Input 38
@RO – RS232: Assign the Routing Table 39
%RD – RS232: Display the Routing Table 40
%RX- RS232: Clear Routing Table 40
%SD- Shutdown the Switch 41
%XS - Cross-point Map: Save Video and RS232 Preset 41
%XR - Cross-point Map: Recall Preset 41
Voyager Matrix Routing Commands 42
@VO - Route Video Output 42
#VO - Route Video Output 42
@VI - Route Video Input (Simplex connect) 43

#VI - Route Video Input (Duplex cross-connect) 43
Voyager Matrix: Salvo Video-switching Commands 44
&VI - Salvo Route Video Input by Range 44
Voyager Link: Serial Control 45
Serial Interface Format 45
Cabling 45
Functionality 45
Device Management 46
Voyager Link Control Protocol (VLCP) Overview 46
Operating Modes 47
Voyager Device Addressing: Factory Default 48
Voyager Device Addressing: User Specified 49
Voyager Set-Receiver-Address Command 49
VLCP Usage 50
Remote Control Prefix Character "!" 50
Using Device Remote-Control 50
Command Sequence 51
String Format 51
Device Settings Volatility 52
VLCP General Commands 52
O – Go Online 52
R – Read Buffer 52
Q – Quiet Mode 52
E – Character Echo 53
L – Lock Panel Buttons 53
C – Control EDID Management 53
P – Video Optical Port Selection 54
V - Video Mute 54
Z – Reset Device 54
TN – Audio Tone Testing 55
GI – Audio Analog Gain Control 55
GO – Audio Analog Gain Control 56

MI – Audio Channel Mapping....56
SO – Audio Optical Port Selection....57
AO – Audio Analog Out Settings....57
HO – Audio HDMI Out Settings....58
I – Device Information....58
I0 – Get Device Name....58
I1 – Get Device Physical Address....58
I2 – Get Device Physical and User Addresses....59
I3 – Get CRC of the Video Data Path....59
I5 – Get Device Firmware Version....59
I6 – Get Device Optical Link Status....60
I7 – Get Device Video Status....60
I8 – Read EDID Contents....61
I9 – Read LED Buttons Status....61
I10 – Get System Status....61
I11 – Get Attached Monitor Name....62
VLCP S-Registers: Address, Command, Device Configuration....62
S1 – Quiet Time for Set-Receiver-Address Command....62
S2 – Set "Set-Receiver-Address" Command Address Delimiter Char....62
S3 – Execution Timeout for "Set-Receiver-Address" Command....62
S4 – Quiet Time for "Command-Mode" Sequence....63
S5 – Set "Command Mode" Attention Char....63
S6 – Execution Timeout for "Command Mode" Sequence....63
S7 – Command Mode Idle Timeout....63
S8 – Set Device Address....64
S10 – Sticky-Receiver-Address Control....64
VLCP S-Registers: Serial Port Configuration....64
S20 – Serial Port Format....64
S24 – Serial Port Format <LF> Control....65
S25 – Serial Port Duplex Control....65
S27 – Set Unselected RX Behavior....65
SC – Scaler Configuration....66

SC – Scaler Mode Information 66
Write Scaler Mode.....66
Write Scaler Register 66

About this Manual

This manual describes the control protocol for Magenta Voyager™ elements and contains the following information:

- Product overview
- Product specifications
- Installation and configuration instructions
- Troubleshooting
- Additional information

The Magenta Voyager™ series is a family of video extension products primarily using fiber-optic technology. As a product family, it supports a range of digital and analog video formats, extending their reach using readily available IT-grade fiber-optic cable. For more information about the Magenta Voyager series of video extension products, see the *Voyager Links Installation and User Guide*.

Product Overview

The Voyager product line consists of following elements:

- **Video extension links:** These include transmitters (VG-TX2, VG-TX4) and receivers (VG-RX2, VG-RX4). These are referred to in this guide as *Voyager Link*.
- **Video matrix switches:** These include the switch frames VG-Matrix 48 and VG-Matrix 160. These are referred to in this guide as *Voyager Matrix*.

Voyager Matrix Control Overview

The Voyager Matrix chassis supports a number of ports for changing settings and controlling the switch matrix. The following table describes the Voyager Matrix ports.

Table 1. Voyager Matrix Ports

Quantity	Description
1	Front serial port, RS-232.
2	Rear serial ports, RS-232 or RS-422 (software selectable).
1	Front (or rear) USB(device) port. Type "B".
1	Rear 10/100/1000-BaseT LAN port.

IP control (via the LAN port) uses the same commands as the serial ports, except it uses a standard Telnet session. For more information, see www.ietf.org, search for "Telnet". The USB (device) port provides a "virtual COM port" function, wherein the same serial control commands can be used.

Note: The VG-Matrix 160 (not VG-Matrix 48) has an optional Touchscreen PC available as a factory-installed option. With the integrated Touchscreen PC, there are additional ports on the chassis which connect directly to the PC (not to the switch control logic). The following table describes these additional ports.

Table 2. VG-Matrix 160 Touchscreen PC Ports

Quantity	Description	Referenced in Figure 1
1	Front USB (host) port. Type "A"	USB-TC(1)
2	Rear USB (host) ports. Type "A"	USB-TC(2) and USB-TC(3)
1	Rear serial port, RS-232	COM-TC
1	Rear 10/100/1000-BaseT LAN port	LAN-TC

Note: The functionality of these additional Touchscreen PC ports is beyond scope of this document.

Voyager Matrix Internal Block Diagram

The following figure shows a simplified block diagram of the various Voyager Matrix ports.

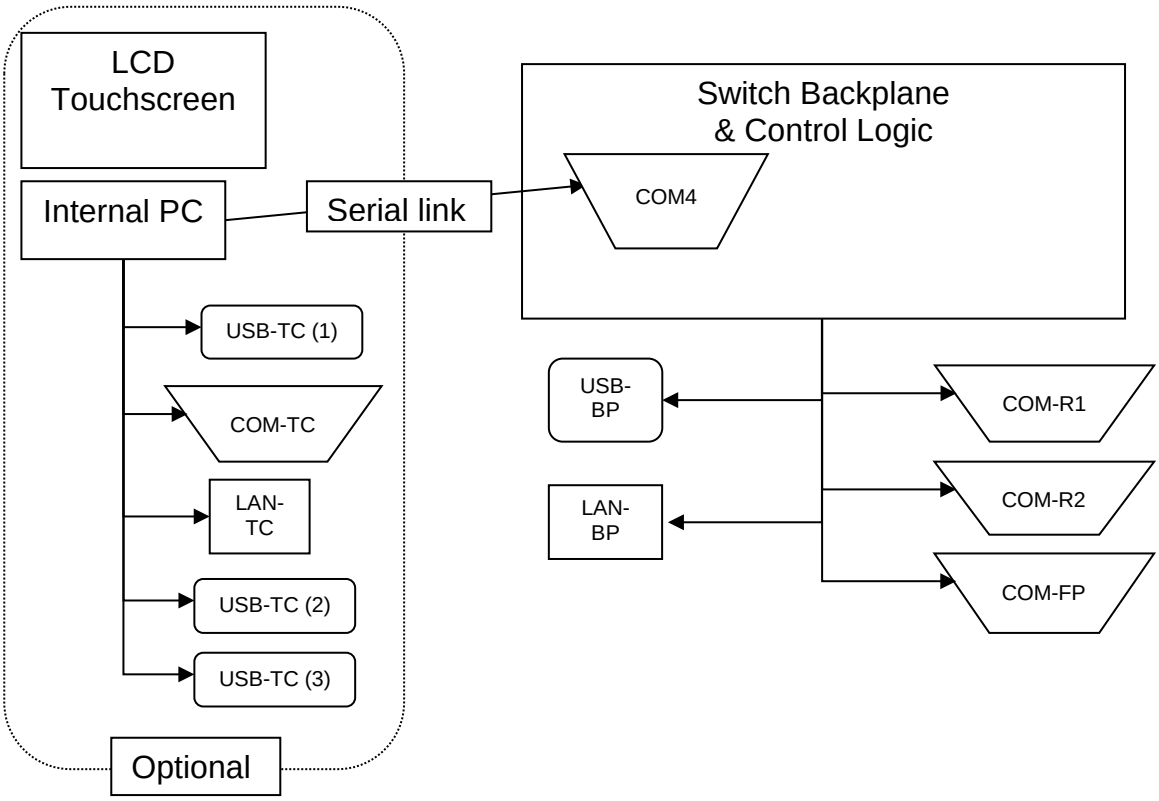


Figure 1. Voyager Matrix Ports

Voyager Matrix Serial Interface

The following table describes the Voyager Matrix interface parameters for the primary front and rear physical serial ports.

Table 3. Interface Parameters

Item	Description
Default serial format	9600, no parity, 8 data bits, 1 stop bit (9600,n,8,1)
Available baud rates	9600, 19200, 38400, 57600, 115200
Available data format	7- or 8-bit ASCII (high bit is forced to 0)
Available parity bits	Odd, even, or none
Available stop-bits	1 or 2
Available handshaking	None

Character Abbreviations

All commands use the following character abbreviations:

<LF> = “Line Feed”, or 0A Hex

<CR> = “Carriage Return”, or 0D Hex

Note: All commands must be terminated with a single Carriage Return **<CR>** character (0D Hex) after the last character / parameter in the command. The switch processes each Carriage Return terminated string as a “command string”.

Note: Except where specifically noted, all responses from the switch (including the command and error prompts) are appended with a Carriage Return **<CR>** (0D Hex) and Line-Feed **<LF>** (0A Hex) character sequence in order to format the output in a terminal window.

Note: There is a system configuration setting which can disable the <LF> character on a port-by-port basis. Some external control systems might prefer not to receive the <LF> character.

Voyager Matrix Physical Description

The Voyager Matrix switch chassis is currently available in two configurations. The following table describes these configurations.

Table 4. Voyager Matrix Physical Description

Model	I/O Port Modes	Max # Inputs	Max # Outputs	Max I/O	Max # I/O Cards
		Simplex Routing		Duplex Routing	
VG-Matrix 48 (VGM-48)	Simplex/Duplex	48	48	I + O = 48	6
VG-Matrix 160 (VGM-160)	Simplex/Duplex	160	160	I + O = 160	20

The same VGM-48 (or VGM-160) switch can be used for simplex or duplex routing. There is one system-configuration setting that controls the general behavior of the system. Refer to serial command **"%SC43"**.

Voyager Matrix Slot Assignments

The following table shows the I/O card slot (and port) numbering (rear panel view) for the VGM-48.

Table 5. VGM-48 I/O Card Slot Numbering

TOP	
I/O Slot 5 [ports 33-40]	I/O Slot 6 [ports 41-48]
I/O Slot 3 [ports 17-24]	I/O Slot 4 [ports 25-32]
I/O Slot 1 [ports 1-8]	I/O Slot 2 [ports 9-16]
BOTTOM	

The following table shows the I/O card slot (and port) numbering (rear panel view) for the VGM-160.

Table 6. VGM-160 I/O Card Slot Numbering

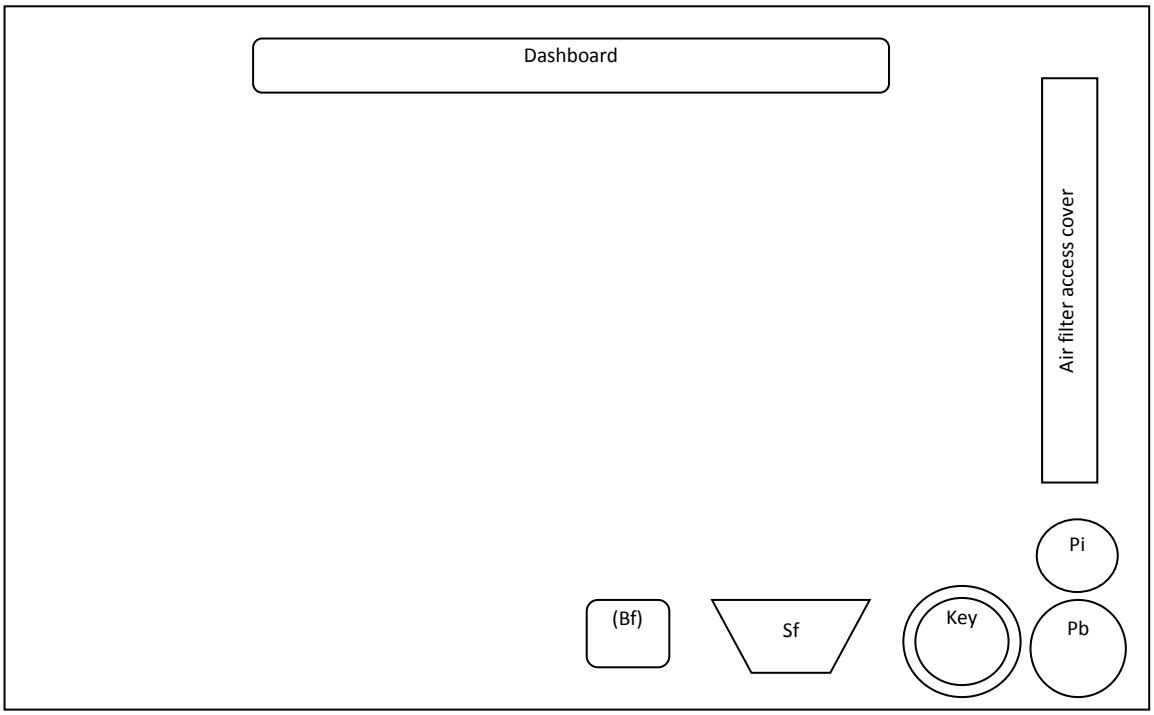
TOP	
I/O Slot 19 [ports 145-152]	I/O Slot 20 [ports 153-160]
I/O Slot 17 [ports 129-136]	I/O Slot 18 [ports 137-144]
I/O Slot 15 [ports 113-120]	I/O Slot 16 [ports 121-128]
I/O Slot 13 [ports 97-104]	I/O Slot 14 [ports 105-112]
I/O Slot 11 [ports 81-88]	I/O Slot 12 [ports 89-96]
I/O Slot 9 [ports 65-72]	I/O Slot 10 [ports 73-80]
I/O Slot 7 [ports 49-56]	I/O Slot 8 [ports 57-64]
I/O Slot 5 [ports 33-40]	I/O Slot 6 [ports 41-48]
I/O Slot 3 [ports 17-24]	I/O Slot 4 [ports 25-32]
I/O Slot 1 [ports 1-8]	I/O Slot 2 [ports 9-16]
BOTTOM	

There is a slot-number identification label affixed to the rear of the chassis (part of the fan-tray assembly) to assist in identifying slot locations.

Note: Not all slots contain I/O cards. However, any empty slots MUST be covered by a slot filler-plate, to maintain proper airflow and cooling within the chassis.

VG-Matrix 48 Front Panel View

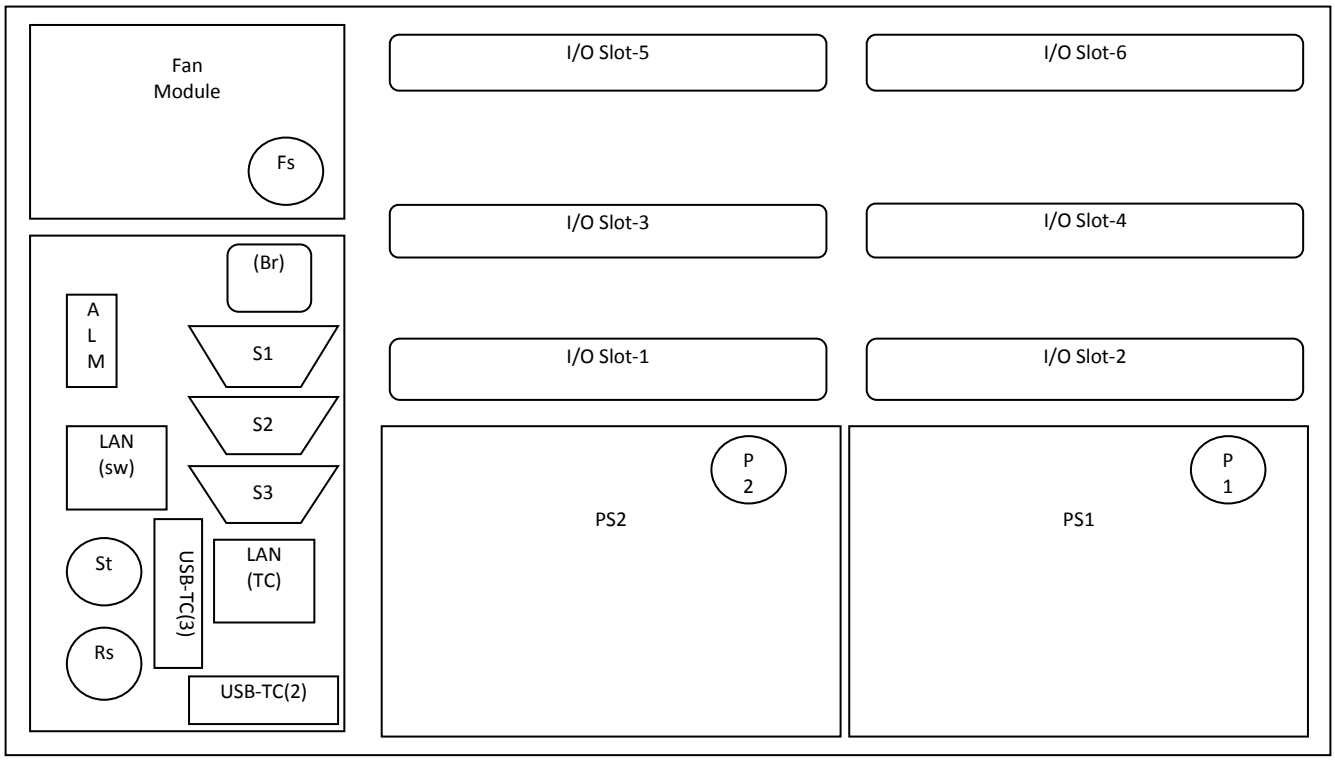
The front panel of the Voyager VG-Matrix 48 switch has the following ports, controls and indicators available.



Item	Description
Dashboard	Status indicator bar (8 backlit icons).
(Sf)	Front system RS-232 serial port. Label = “COM-F1”
(Bf)	Front system USB (device) port (type “B”). Label = “USB-config(F)”
Key	Keylock switch.
Pb	Pushbutton power/control switch.
Pi	Power status indicator lamp (red/green LED).

VG-Matrix 48 Rear Panel View

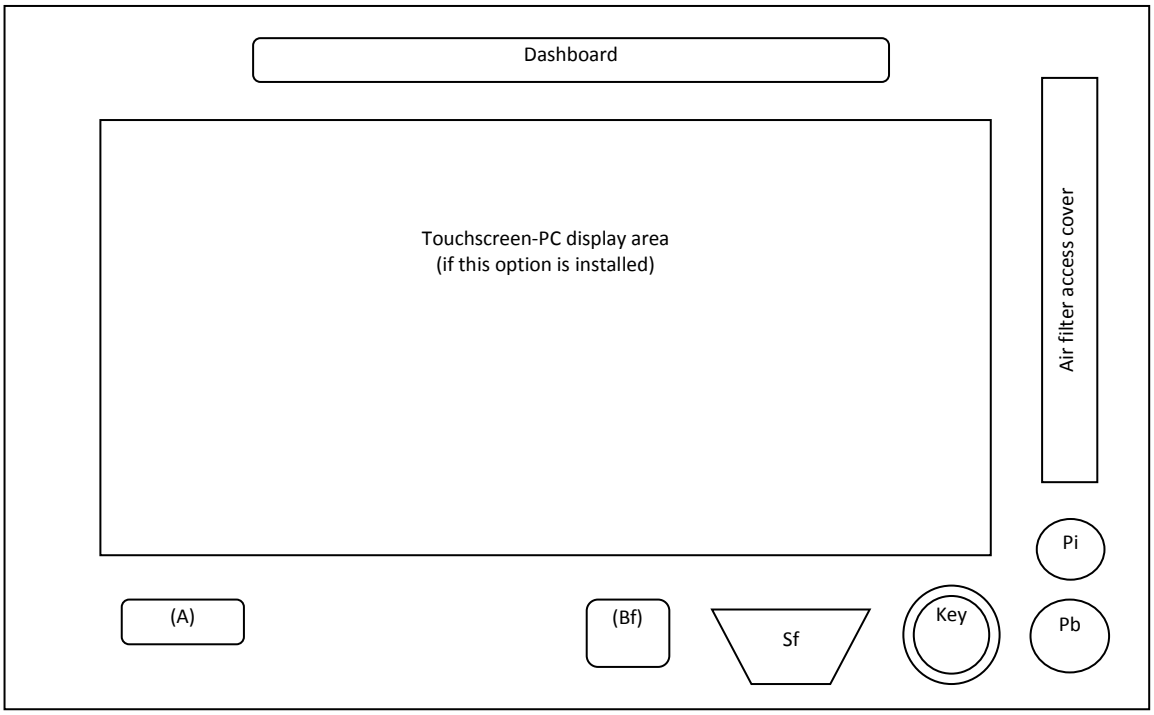
The rear-panel of the Voyager VGM-48 switch has the following ports, controls and indicators available:



Item	Description
Fan Module	Hot-swappable fan module assembly.
ALM	Alarm-contact output connector. Label = “ALM”.
LAN(sw)	LAN port, connected to the main switch logic. Label = “LAN”.
St	Reset-status LED. Label = “Status”.
Rs	Reset configuration/control pushbutton (recessed). Label = “Reset”.
(Br)	System USB (device) port (type “B”). Label = “USB-Config (R)”.
S1	System serial port “COM1”, RS-232 or RS-422. Label = “COM-R1”.
S2	System serial port “COM2”, RS-232 or RS-422. Label = “COM-R2”.
S3	Touchscreen-PC serial port. RS-232 only. Label = “COM-TC”.
LAN(TC)	Touchscreen-PC LAN port. Label = “LAN-TC”.
USB-TC(2)	Touchscreen-PC USB port #2. Label = “USB-TC(2)”.
USB-TC(3)	Touchscreen-PC USB port #3. Label = “USB-TC(3)”.
PS1, PS2	Hot-swappable power-supply modules.
P1, P2	Power supply status indicators.
I/O Slot 1..6	Hot-swappable I/O slots. Each slot can support up to 8 input/output ports.
Fs	Fan-tray status indicator.

VG-Matrix 160 Front Panel View

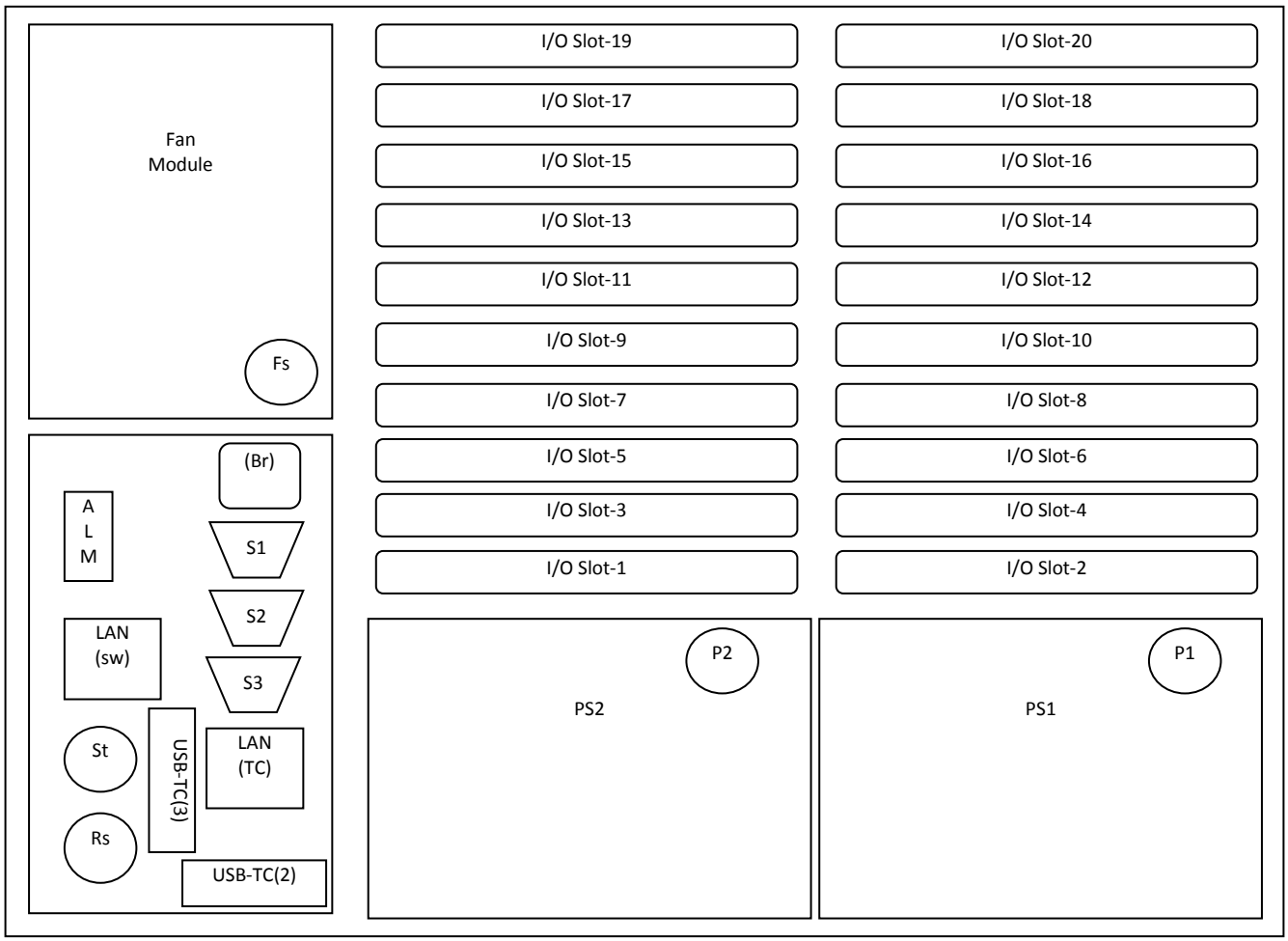
The front panel of the Voyager VG-Matrix 160 switch has the following ports, controls and indicators available.



Item	Description
Dashboard	Status indicator bar (8 backlit icons).
(A)	Touchscreen-PC USB (host) port (type "A"). Label = "USB-TC".
(Sf)	Front system RS-232 serial port. Label = "COM-F1"
(Bf)	Front system USB (device) port (type "B"). Label = "USB-config(F)"
Key	Keylock switch.
Pb	Pushbutton power/control switch.
Pi	Power status indicator lamp (red/green LED).

VG-Matrix 160 Rear Panel View

The rear-panel of the Voyager VGM-160 switch has the following ports, controls and indicators available:



Item	Description
Fan Module	Hot-swappable fan module assembly.
ALM	Alarm-contact output connector. Label = “ALM”.
LAN(sw)	LAN port, connected to the main switch logic. Label = “LAN”.
St	Reset-status LED. Label = “Status”.
Rs	Reset configuration/control pushbutton (recessed). Label = “Reset”.
(Br)	System USB (device) port (type “B”). Label = “USB-Config (R)”.
S1	System serial port “COM1”, RS-232 or RS-422. Label = “COM-R1”.
S2	System serial port “COM2”, RS-232 or RS-422. Label = “COM-R2”.
S3	Touchscreen-PC serial port. RS-232 only. Label = “COM-TC”.
LAN(TC)	Touchscreen-PC LAN port. Label = “LAN-TC”.
USB-TC(2)	Touchscreen-PC USB port #2. Label = “USB-TC(2)”.
USB-TC(3)	Touchscreen-PC USB port #3. Label = “USB-TC(3)”.
PS1, PS2	Hot-swappable power-supply modules.
P1, P2	Power supply status indicators.
I/O Slot 1..20	Hot-swappable I/O slots. Each slot can support up to 8 input/output ports.
Fs	Fan-tray status indicator.

Voyager Matrix Control Port Designation

All the Voyager matrix control ports are assigned Port-ID numbers, whether they are real serial ports or control ports operating over other interfaces or protocols (such as USB or LAN). These port-IDs are to be used when referring to control ports in the configuration or setup of the switch. Also refer to system configuration command %SC36.

The following table describes the Voyager Matrix ports.

Table 7. Voyager Matrix Control Ports

Software Port-ID #	Port Name	Description
1	COM-R1	RS-232/422 serial port. Rear connector panel
2	COM-R2	RS-232/422 serial port. Rear connector panel
3	COM-FP	RS-232 serial port. Front panel
4	Touchscreen PC	Internal RS-232 serial port – not user accessible. This is reserved for the internal Touchscreen PC.
5	USB-Config(R) or (F)	Virtual control port using the rear panel (default) or front panel (optional) USB port.
6	LAN	Virtual control port using the LAN connector on the rear panel.

The first 3 ports have some configurable parameters (like baud rate, 232/422 mode, etc.), whereas the other "virtual ports" may have other user-configurable parameters.

System Power & Thermal Management

The Voyager switch software has a system-monitoring and power control strategy which always seeks to ensure the safety of the operator, power supplies, and other internal subsystem components. If a fault is detected during normal operation, it will be classified as either a major fault, or a critical fault.

Response to Major System Faults

These are faults which can cause an orderly (delayed) shutdown:

- Fan assembly removed for an extended period of time. Ultimately this WILL cause an over-temp condition.
- Fan fault (under-speed) detected on more than 1 fan for more than 30 minutes.
- Over-temp conditions, above the "ALARM" threshold.
- Internal fault detected on one of the redundant main power supplies (which can sometimes be cleared by a re-start).

Note: An orderly shutdown will allow the system to attempt to report the critical event via a control port to an external system.

Response to Critical System Faults

These are faults which can cause an immediate shutdown, likely with no external notification (other than the alarm-relay contacts):

- Both power supply modules report an internal fault.
- One or more internal DC power rails out of tolerance.
- Over-temp condition detected in the internal crosspoint chip. This is a critical system component that can be permanently damaged by continued operation at very high temperatures.

Automatic Restarts

The auto-restart feature essentially attempts to maximize system up-time by trying to restore normal operation with no operator intervention (if at all possible).

The system monitoring software can be configured for the following actions:

- Never attempt an auto-restart.
- After **T** minutes rest (power-down), attempt **N** auto-restart cycles. (with no less than **I** minute intervals).

  Where:

  T = Rest period after initial fault, 1 to 10 minutes.

  N = Maximum number of auto-restart tries, 1 to 10.

  I = Rest interval between auto-restart events.

Note: An auto-restart sequence is not initiated for over-temp conditions until the measured temperature is below the "WARNING" threshold.

Voyager Matrix Command Overview

Control port commands are divided into functional groups, identified by a specific prefix character.

Table 8. Command Prefixes

Command Prefix	Description
%	General system commands: initialization, configuration and system status.
@	Simplex routing commands: for making simplex [1:1] and [1:n] connections.
#	Duplex routing commands: for making duplex [1:1] and [1:n] connections.
&	Salvo commands: shortcut for making [1:n] connections.
$	Serial-routing commands and data packets.

Command Execution

Since the Voyager switch has multiple control ports, it's possible to control the switch with multiple external control systems. To address "multiple control points" contention issues, the switch software implements the following strategy:

- At each control port, all the characters in a command line are accumulated until the final <CR>.
- **Only** when the <CR> is received will the command line from that control port be processed.
- The result(s) of each command line are returned only to the control port that originally submitted the command line.
- If a command causes an error, the command-string is saved for subsequent retrieval using the %RE command.
- Since there is only one command processor in the switch, only one command is executed at a time.

Another software feature which assists when using multiple external control systems is the "unsolicited response" mode for each control port. Turning this feature on will enable a control system to be alerted to alarm conditions, and events which may have been caused by other connected control systems. Obviously, each control system must be programmed to expect these unsolicited responses.

Command Format

Control port commands can be formatted as follows:

Prefix | *Command* | [*Parameter*[,]] | **<CR>**

Where…	**Is…**
Prefix	One of the single-character command-prefix characters, as noted above.
Command	Detailed in following sections.
Parameter	Follow the command. Multiple parameters are delimited with a single comma **“,”** character.

Note: All command strings must end with a single **<CR>** carriage-return (hex-0D) character.

Unless explicitly stated, all other whitespace characters will be **safely ignored**. This includes:

- <TAB> or hex-09
- <SPACE> or hex-20
- <NULL> or hex-00
- <DEL> or hex-7F
- All other control characters between <Ctrl-A> (hex-01) and <Ctrl-_> (hex-1F), except for <Ctrl-M> (hex-0D, which is the standard “line terminator” character).

Notes:

- Some commands may allow embedded <SPACE> characters. However, in all cases leading and trailing spaces are safely ignored.
- An empty command line (**<CR>** by itself) does not cause an error, it simply returns another OK> prompt.
- The “[“ and “]” characters are reserved for future use. Do not use these in any command string.

Switch “input” and “output” ports and numbering

On the rear panel of the switch, all I/O port positions are permanently numbered on the chassis. There are 8 SFP ports on each I/O card.

Each switch port consists of one SFP (optical) transceiver module. Each SFP transceiver has an INPUT side (laser light enters), and an OUTPUT side (laser light is emitted).

Therefore, the VGM-160 switch will have 160 SFP ports, and the VGM-48 will have 48 SFP ports.

You do not need to populate all the SFP ports with optical modules – only as many ports as you need for your application. Unused, empty SFP ports (no optical module present) should be covered with an SFP “dust plug”.

The SFP ports can be connected in the switching matrix using simplex-routing commands (an SFP “RX” port connects to one or more SFP “TX” ports).

There are also convenient duplex-routing commands, which will automatically cross-connect TX/RX signals of one SFP port to another, thereby allowing a bidirectional data path. You can still cross-connect ports using simplex commands – you just need to use two commands rather than one.

For switch matrix control commands to be applied correctly, it is important for the control software to know how each port is being used (as a signal source – an input, or a signal sink – an output). The switch itself does not know if a port is being used for simplex or duplex connections, or whether the attached device is a video source (Voyager link transmitter) or sink (Voyager link receiver & display).

For SFP ports intended to be used in duplex mode, there is **no restriction** on the order or number of ports used as switch “inputs” (video sources) or “outputs” (video sinks/displays). However, to minimize the potential for confusion by service techs, a mixed or random assortment of port-types is discouraged. It’s best to try and group all inputs on one side of the chassis, and all outputs on the other side. Or – use whatever physical grouping is convenient and makes sense for a particular installation and cable-dressing requirements.

Standard Command Responses

In addition to any "results" from a command (if applicable), there can be several possible standard responses from the system:

Normal Response

"OK>"**<CR><LF>** (Total of 5 characters.)

The "OK>" prompt indicates the system has processed and completed the previous command, and is ready to accept a new command.

Error Response

"ER*xx*>"**<CR><LF>** (Total of 7 characters.)

The "ER*xx*>" prompt indicates there was an error in the last command, and the system is ready accept a new command.

Where *xx* is the error-code from the previous command:

00 = Invalid user.

01 = Invalid command.

02 = Command failed, possibly due to an invalid parameter.

04 = Command failed, input port is not a valid value.

05 = Command failed, output port is not a valid value.

Note: Additional codes are reserved for future use.

Extended Response Format

If a command initiates an extended response from the system (for example, %XD returns a list of input/output connections) the response string is sent (line by line, each terminated with <CR><LF>), then followed by the "OK>" or "ER*xx*>" prompt at the end, as needed. As noted, each line of characters from the system is always appended with <CR> and <LF>, to enable easier reading on a terminal screen (such as HyperTerm).

Unsolicited Responses

The switch software supports "unsolicited responses", configurable on a per-control-port basis. If enabled, the system will transmit an unsolicited-event code under certain conditions, or triggered by specific events. The control system should be prepared to expect these codes. This is often useful in multi-user configurations, and for live-status display and general system monitoring functions by one or more connected control systems.

The unsolicited response messages always begin with "!", end with a "<" and are normally 5 characters long (total). **Note:** For these unsolicited responses, there are no trailing **<CR>** or **<LF>** characters.

Alarm/event-code:	"!A*xx*<"	= alarm/event activated
	"!C*xx*<"	= alarm/event cleared
	"!R00<"	= Power-up reset string

Where *xx* is a 2-digit event code:

00 = All previous alarms were cleared (only used as "!C00").

01 = Main power event:

Used as "!A01" = **power-down**, "!C01" = **power-up**.

02 = Over-temp condition: PS1.

03 = Over-temp condition: PS2.

04 = Over-temp condition: internal cross-point chip.

05 = Over-temp condition: one of the I/O cards.

06 = Power fault: PS1 failed.

07 = Power fault: PS2 failed.

08 = Power fault: an internal DC rail is out of range.

09 = Fan fault: one or more fans are under/over-speed.

10 = Filter fault: Air filter removed.

11 = Filter replacement alert.

Used as:

"!A11<" = Filter needs replacement (interval has reached 0).

"!C11<" = Filter was replaced (interval register re-set).

… = TBD

Note: The **Power-down** event can only happen when the switch software determines an orderly self-power-down is needed due to a *major* fault. If the system shuts down due to a *critical* fault (for example, loss of AC power) then no event code will be transmitted. The **Power-up** event is transmitted every time at least one AC switch is turned on and DC powered is enabled manually or automatically, or if the system executes an automatic power-restart after a fault condition is corrected.

Change/event-code:	"!Mxx<"	= Change in settings occurred
	00 = No changes to report.	
	01 = Matrix connections have changed.	
	… = All other values are reserved for future use.	

Note: If a matrix-change occurred, it is up to the external control system to re-read the matrix settings to determine what the new settings are.

Note: Refer to system configuration setting %SC26 to globally enable/disable unsolicited messages to all ports (not selectively). Also, system configuration parameter %SC37 through %SC42 can enable/disable these messages on a selective basis.

Power-up Reset String

Every time the switch chassis is powered up, a power-up reset string will be transmitted from each control port. The power-up reset string is formatted slightly differently from other unsolicited messages:

```
“!R=00,VGM-160<
```

Which is then closely followed by:

```
“!C01<”
```

which indicates the “power- up” event has happened.

Notes:

- The “00” field is extended power-up status information. Currently this field is set to “00”, but may change with future firmware revisions.
- The “VGM-160” field is the switch model # in this example. The VGM-48 would likewise respond with “VGM-48” in this field.

Power-down String

Every time the switch chassis is powered-down by user or software initiated means, a power-down string is transmitted to all control ports (serial, USB, Telnet, etc.):

```
“!A01<
```

Power-down Methods

The following table shows several ways to shut down the system.

Table 9. Power-down Methods

To power down…	Perform these steps…
Using the power button	Press and hold the front-panel soft-off button for more than 6 seconds. This initiates a graceful shutdown of the chassis (and Touchscreen PC, if present).
Using the Touchscreen PC	• From the Magenta control GUI, select the **System Shutdown** button. • From the Windows desktop menu, select **Start > Shutdown**. Either one of these initiates a graceful shutdown of the chassis and Touchscreen PC.
Self-initiated	The internal status & safety monitoring software routines may initiate a system shutdown in some cases. For example: an over-temperature condition, or a failed power-supply rail. No user-intervention is required for this automatically initiates shutdown. • This initiates a graceful shutdown of the chassis (and Touchscreen PC, if present).
Hard shutdown	If none of the above methods work (due to a system error or other reason), it is certainly possible to force the system off immediately by using the AC-mains switches on the back of the chassis. Note that BOTH power supplies will need to be turned OFF for the system to be shut down completely. There is no "!A01<" unsolicited message transmitted when a hard-shutdown is used.

WARNING: A hard shutdown **CAN** cause corruption of data in the TouchscreenPC, or possibly even render the TouchscreenPC unbootable. Usually the Windows operating system can recover from a hard shutdown, but it is not unusual for this event to cause temporary or permanent problems with the OS or registry.

Power-down Sequence

For all the "graceful" shutdown methods (1-3), the following sequence of events takes place:

1. Front-panel power-status indicator (near pushbutton) turns RED.
2. The TouchscreenPC (if present) immediately exits the UI software (or any other program) and begins a graceful Windows shutdown.
3. When the Windows shutdown process is complete, the TouchscreenPC turns itself off.
4. If Windows requires any kind of S/W updates during the shutdown process, this can add a considerable amount of time to the overall shutdown process. The chassis will NOT shut down until the PC has completed whatever updating tasks are in progress.
5. The backplane logic proceeds to turn off all DC power rails.
6. The front-panel power-status indicator turns off.
7. System is now fully in the soft-off state.

Notes:

- If the TouchscreenPC (or external device) is not able to shut down (Windows can sometimes hang for a variety of reasons), the backplane logic will maintain all system power ON indefinitely.
- Windows may hang, or take an unacceptably long time to shut down (for a variety of reasons). In this case, then only way to clear this condition is to switch OFF the main AC supply switches on the rear of the chassis.

Voyager Matrix: General Commands

These commands handle general system functions. All general commands are prefixed with the "%" character.

%RE – Read Last Error

Description	Retrieves the specific command line that caused the most recent error.
Command	%RE<CR>
Arguments	None
Response	*CommandErr*<CR><LF> OK><CR><LF> Where *CommandErr* is the command that caused the error.
Example	User enters an invalid @VI switch command, which causes an error response. Command: `@VI3,Z10<CR>` Response: `ER02><CR><LF>` User enters %RE command. Command: `%RE<CR>` Response: `@VI3,Z10<CR>` `OK><CR><LF>`

%ST - System Temperature Report

Description	The Voyager switch has a number of internal temperature sensors that continuously monitor thermal conditions inside the chassis. They are placed in these strategic locations: • 1 temp-sensor located in each power-supply module (total = 2). • 1 temp-sensor located on the main switch-crosspoint logic chip (on the backplane PCB). • 1 temp-sensor located on each installed I/O card.
Command	%ST<CR>
Arguments	None
Response	*tps1,tps2,tint,tio1…tioNN*<CR><LF> OK><CR><LF> Where… Is… *tps1* Temperature of PS1 module. (-99 if PS1 not installed) *tps2* Temperature of PS2 module. (-99 if PS2 not installed) *tint* Temperature of internal crosspoint chip. *tio1..tioNN* Temperature of each I/O slot. (-99 if card not installed)
Example	A VG Matrix 160xs switch chassis, but only I/O slots 1, 2 and 4 are populated. Slot-3 is empty. Command: `%ST<CR>` Response: `+38,+37,+41,+26,+27,-99,+35<CR><LF>` `OK><CR><LF>`

Note: All temperature measurements are reported in degrees Celsius (*centigrade*). The temperature value itself can be 1 or 2 digits long, and will have a leading "+" or "-" sign. For example:

"+1" = +1 degree Celsius. "+0" = 0 degrees Celsius.

"-1" = -1 degree Celsius. "+25" = +25 degrees Celsius.

Minimum possible reported temperature is -10.

Maximum possible reported temperature is +90.

Note: The power supply modules have another buried, internal temperature sensor. This sensor is not accessible for reading out the specific temperature. In case of an over-temp condition in this area the power supply module simply reports a critical-fault condition in the power-supply.

%SI - System Initialization

Description	This command will re-initialize the switch frame by executing the power-up sequence. The system geometry (I/O cards will be detected, the warning LEDs will cycle through every color / state, etc.). If a parameter (other than 0) is provided, then after the power-up reset additional configuration changes will be applied. See chart below.
Command	%SI*i*<CR>
Arguments	Where *i* is the initialization type: 0 (or blank) = Standard power-up initialization. 1 = Master reset (everything cleared or defaulted). 2 = Matrix I/O map cleared. 3 = IP (LAN) settings set to factory defaults.
Response	OK><CR><LF>
Example	Command: `%SI<CR>` Response: `OK><CR><LF>` Depending on current system settings, the switch may transmit other unsolicited event/alarm codes, just as it would if the power switch were actuated manually.

After the power-up initialization, and any additional configuration changes are applied (as specified with the "I" parameter), the last (or new) cross-point routing map is restored automatically.

System Geometry

The following commands return various types of system geometry information.

%SG0 - System Geometry General Information

Description	This command returns general information about system geometry.
Command	%SG0<CR> *or* %SG<CR>
Arguments	None
Response	*ss*,*st*,*pp*<CR><LF> OK><CR><LF> Where… Is… *ss* Switch size: 160 *st* Switch type: 0 = reserved for future use *pp* Total number of I/O ports currently installed.
Example	Command: `%SG<CR>` Response: `160,0,160<CR><LF>` `OK><CR><LF>`

%SG1 - System Geometry Port Info

Description	This command returns information about each I/O port.
Command	%SG1,*p*<CR>
Arguments	Where *p* is the port number.
Response	*p*,*t*<CR><LF> OK><CR><LF> Where… Is… *p* Port number (1..switch-size). Use * for all ports. *t* Port type: 0 = None 1 = MM2K fiber transceiver (2 fibers), short-range 2 = SM4K fiber transceiver (2 fibers), medium-range 3 = SM30K fiber transceiver (2 fibers), long-range (other values reserved for future use)
Example	This means Port 3 has an MM2K fiber-optic transceiver installed. Command: `%SG1,3<CR>` Response: `3,1<CR><LF>` `OK><CR><LF>`

%SG3 - System Geometry I/O Card Presence

Description	This command returns the presence of each IO-Card.
Command	%SG3<CR>
Arguments	None
Response	*cp1,cp2,…,cpx*<CR><LF> OK><CR><LF> Where *cpx* is card presence for each slot.
Example	The VGM160 frame contains the 8 first card install. Command: `%SG3<CR>` Response: `1,1,1,1,1,1,1,1,0,0,0,0,0,0,0,0,0,0,0,0<CR><LF>` `OK><CR><LF>`

Device Information

The following commands return various types of device information.

%D10 – Device Information Switch Information

Description	This command returns device switch information.
Command	%DI0<CR>
Arguments	None
Response	*dt,fs,ti,sn,fw,lu*<CR><LF> OK><CR><LF> Where… Is… *dt* Device type: 1 = Voyager Matrix *fs* Frame size: 48 or 160 *ti* Total ports installed *sn* System serial number (16 digit long) *fw* System firmware version *lu* Last F/W update date
Example	In this example, the command returns this information: • This is a VG-Matrix switch chassis. • Frame size = 160. • There are 40 ports currently installed. • System serial number is 1234567890123456. • System firmware version is 3.1.1. • The firmware was last updated on 01/01/2010. Command: `%DI0<CR>` Response: `1,160,80, 1234567890123456,3.1.1,01/01/2010<CR><LF>` `OK><CR><LF>`

%DI1 – Device Information Version Numbers

Description	This command returns the device version numbers.
Command	%DI1<CR>
Arguments	None
Response	*bk,mc,io1,io2*…<CR><LF> OK><CR><LF> Where… Is… *bk* Backplane FPGA firmware version. *mc* MCU firmware version. *ioX* IO card version number.

Example	In this example, the command returns the following information:
	• The BackPlane FPGA Version number is 3.1.209.0013
	• The MCU Version Number is 5.1.4.0036
	• There is an IO Card Version number 4.2.4 in slot 1
	• There is an IO Card Version number 4.2.4 in slot 2
	• There is no IOCArd in slot 3 to 20
	Command: `%DI1<CR>`
	Response:
	`3.1.209.0013,5.1.4.0036,4.2.4,4.2.4,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,<CR><LF>`
	`OK><CR><LF>`

%DI2 – Device Information: IO Cards Version Numbers

Description	This command returns the IO card version number with build number.
Command	%DI2**<CR>**
Arguments	None
Response	*io1,io2…,ioX*<CR><LF> OK><CR><LF> Where… Is… *ioX* IO card version number.

Example	In this example, the command returns the following information:
	• There is an IO Card Version number 4.2.4.2 in slot 1
	• There is an IO Card Version number 4.2.4.2 in slot 2
	• There is no IO Card in slot 3 to 20
	Command: `%DI2<CR>`
	Response: `4.2.4.2,`
	`4.2.4.2,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,<CR><LF>`
	`OK><CR><LF>`

%DG – Diagnostic Information

Description	This command retrieves system hardware-status information.
Command	%DG*s*<CR>
Arguments	Where *s* is: 0: All measured voltages. 1: All PS status info. 2: All fan status info. 3: All air-filter status info. 4: All alarm conditions currently active. 5: All I/O card power-supply status info.
Response	*StatusInfo* OK><CR><LF> Where *StatusInfo* is the status information for the hardware specified by the command.
Example	In this example, user requests fan-status info (s=2). The system returns that all 4 system fans are working within limits: Fan1 = 2600 RPM, Fan2 = 2615 RPM, Fan3 = 2598 RPM, Fan4 = 2601 RPM. Command: `%DG2<CR>` Response: `0,0,0,0,2600,2615,2598,2601<CR><LF>` `OK><CR><LF>`

%DG0 – System Voltages Report

Description	This command returns the status of system voltages.
Command	%DG0<CR> *or* simply %DG<CR><LF>)
Arguments	None
Response	*v1*,*v2*,*v3*,*v4*,*v5*,*v6*<CR><LF> OK><CR><LF> Where… Is… *v1* +12V main bus voltage. *v2* +5V logic voltage. *v3* +3.3V logic voltage. *v4* +2.5V logic voltage. *v5* +1.2V logic voltage. *v6* +3.3V standby power voltage. **Note:** All voltages are reported as: "+n.nn" or "+nn.nn" with 1 or 2 leading digits, depending on the measurement.
Example	Command: `%DG0<CR>` Response: `+12.10,+5.11,+3.29.+2.51,+1.20,+3.30<CR><LF>` `OK><CR><LF>`

%DG1 – Power Supply Status Report

Description	This command gets the power supply status report.
Command	%DG1<CR>
Arguments	None
Response	*s1*,*s2*,*s3*,*s4*<CR><LF> OK><CR><LF> Where… Is… *s1* PS1 installed: 1 = installed, 0 = absent. *s2* PS1 fault status: 1 = fault, 0 = normal. *s3* PS2 installed: 1 = installed, 0 = absent. *s4* PS2 fault status: 1 = fault, 0 = normal.
Example	User requests power supply status. System returns that both power supplies are installed and operating normally. Command: `%DG1<CR>` Response: `1,0,1,0<CR><LF>` `OK><CR><LF>`

%DG2 – Fan Status Report

Description	This command returns the status of the fan.
Command	%DG2<CR>
Arguments	None
Response	s1,s2,s3,s4,r1,r2,r3,r4<CR><LF> OK><CR><LF> Where… Is… *s1…s4* Fan 1 through 4 status: 0 = normal 1 = RPM too low 2 = RPM too high 4 = Rotor locked *r1…r4* Fan 1 through 4 RPM measurement. Measurement can range from 100 to 9999 RPM.
Example	User requests fan status. System returns all 4 fans operating normally and fan RPM measurements are as follows: Fan1 = 2600, Fan2 = 2601, Fan3 = 2599, Fan4 = 2598. Command: `%DG2<CR>` Response: `0,0,0,0,2600,2601,2599,2598<CR><LF>` `OK><CR><LF>`

%DG3 – Air-filter Status Report

Description	This command returns the air-filter status report.
Command	%DG3<CR>
Arguments	None
Response	*s*,*t*<CR><LF> OK><CR><LF> Where… Is… *s* Air-filter status: 0 = normal, filter is installed 1 = filter removed for < 5 minutes 2 = filter removed for > 5 minutes 3 = filter removed for > 10 minutes 4 = filter removed for > 20 minutes *t* Time left (in days) until filter servicing required. Can range from 0 to *n*, where *n* is a configuration setting. See also "%SC34" command.
Example	User requests air-filter status. System returns that the air filter currently removed for < 5 minutes, and there are 7 days until air-filter service is required. Command: `%DG3<CR>` Request: `1,7<CR><LF>` `OK><CR><LF>`

%DG4 – Alarm Conditions Report

Description	The alarm conditions report will consist of any active alarms which may have been reported using the "unsolicited response" mechanism. This command allows those same alarms to be polled for, rather than use the unsolicited response mode.
Command	%DG4<CR>
Arguments	None
Response	*aa*,*aa*,*aa*…,*aa*<CR><LF> OK><CR><LF> Where *aa* is the 2-digit alarm event code. See the topic Unsolicited Response for the complete list of alarm codes.
Example	User requests alarm conditions report. System returns that 2 alarms are active. PS2 is over-temp (03). An internal DC rail is out of tolerance (08). Command: `%DG4<CR>` Response: `03,08<CR><LF>` `OK><CR><LF>`

%DG5 – I/O Card Power Supply Status Report

Description	This command returns the I/O card power supply status report.
Command	%DG6<CR>
Arguments	None
Response	*s1,…,sN*<CR><LF> OK><CR><LF> Where… Is… *s1…sN* I/O card status: 0 = I/O card not installed 1 = Normal (card installed, normal operation) 2 = FAULT (card installed, fault detected) **Note:** Trailing 0's are suppressed in this report. Control system can assume the I/O card is not installed.
Example	User requests I/O card power supply status report for a VG Matrix chassis 160xs with only the first 3 I/O cards installed. System returns that I/O cards in slots 1 and 2 are operating normally. I/O card in slot 3 has a fault. All remaining I/O slots are empty. Command: %DG6<CR> Response: 1,1,2<CR><LF> OK><CR><LF>

System Configuration Settings

The system configuration command format varies between read setting and write setting. The following sections describe the read and write settings and the item codes.

%SC – System Configuration Settings (Read Setting)

Description	There are numerous system configuration settings. All can be read, most can be written. The factory-default settings should be adequate to perform the initial setup and checkout of the system.
Command	%SC*i*<CR>
Arguments	Where *i* is the system configuration. See the System Configuration Item Codes topic.
Response	*i*,*v*<CR><LF> OK><CR><LF> Where… Is… *i* System configuration item to read. See the System Configuration topic. *v* The current value of the selected configuration item *i*. This value will depend on the specific *i* selected. See below. **Note:** It is also possible to use (*), which will allow reading of every system configuration setting. Use with caution.
Example	User requests system information for control port 1. System returns baud-rate setting for control port 1 (COM(R1)). Command: `%SC1<CR>` Response: `1,9600,8,0,1<CR><LF>` `OK><CR><LF>`

%SC – System Configuration Settings (Write Setting)

Description	There are numerous system configuration settings. All can be read, most can be written. The factory-default settings should be adequate to perform the initial setup and checkout of the system.
Command	%SC*i*,*v1*,*v2*,*v3*,…<CR>
Arguments	Where… Is… *i* System configuration item to write. See the System Configuration Item Codes topic. *v* Value field. This value will depend on the specific *i* selected. See the System Configuration Item Codes topic. **Note:** It is also possible to use (*), which will allow reading of every system configuration setting. Use with caution.
Response	OK><CR><LF>
Example	User sets baud-rate setting for control port 1 (COM(R1)). System returns confirmation. Command: `%SC1,9600,8,0,1<CR>` Response: `OK><CR><LF>`

System Configuration Item Codes

The following table lists every available system configuration item and its settings.

%SC *i* value	Configuration Item Name	Valid Settings (most values are in decimal, unless otherwise noted)	Default
1	Control port 1, Baud Rate (COM(R1))	V1= Baud-rate (9600, 19200, 38400, 57600, 115200) V2= Data width (8,7) V3= Parity (NONE=0, ODD=1, EVEN=2) V4= StopBit (1,2)	9600,8,0,1
2	Control port 2, Baud Rate (COM(R2))	V1= Baud-rate (9600, 19200, 38400, 57600, 115200) V2= Data width (8,7) V3= Parity (NONE=0, ODD=1, EVEN=2) V4= StopBit (1,2)	9600,8,0,1
3	Control port 3, Baud Rate (COM(FP))	V1= Baud-rate (9600, 19200, 38400, 57600, 115200) V2= Data width (8,7) V3= Parity (NONE=0, ODD=1, EVEN=2) V4= StopBit (1,2)	9600,8,0,1
4	Control port 4, Baud Rate (internal for TouchscreenPC)	This comm port cannot be changed.	9600,8,0,1
5	Control port 1, Interface type (COM(R1))	0 = RS-232, 1 = RS-422	0 (RS-232)
6	Control port 2, Interface type (COM(R2))	0 = RS-232, 1 = RS-422	0 (RS-232)
11	IP control: MAC address	(read-only value) Format: xx:xx:xx:xx:xx:xx **Note:** This is a factory-defined setting that cannot be changed.	
12	IP control: IP addressing mode (DHCP enable)	0 = User-assigned IP address (DHCP off) 1 = Server-assigned IP address (DHCP on)	0 (IP = user-assigned, DHCP = off)
13	IP control: User-assigned IP address	aaa.bbb.ccc.ddd (0..255 for each field) 0.0.0.0 = Disable IP (LAN) port.	10.10.0.1
14	IP control: User-assigned IP mask	www.xxx.yyy.zzz (0..255 for each field)	255.255.255.0
15	IP control: User-assigned IP default gateway	eee.fff.ggg.hhh (0..255 for each field) 0.0.0.0 = no gateway assigned.	0.0.0.0 (none)
16	IP control: DHCP-assigned IP address	(read-only value) If the DHCP process is incomplete, return value will be 0.0.0.0 (none).	

%SC *i* value	Configuration Item Name	Valid Settings (most values are in decimal, unless otherwise noted)	Default
17	IP control: DHCP-assigned IP mask	(read-only value) If the DHCP process is incomplete, return value will be 0.0.0.0 (none).	
18	IP control: DHCP-assigned IP default gateway	(read-only value) If the DHCP process is incomplete, return value will be 0.0.0.0 (none).	
19	IP control: Telnet port setting	1..65535 Note: 0 = disable Telnet server	23
22	Auto-restart: enable/disable	0 = off, 1 = on	0 (off – don't auto-restart system)
23	Auto-restart: rest timeout (after fault)	1..999 (minutes)	1
24	Auto-restart: rest timeout (between tries)	1..999 (minutes)	1
25	Auto-restart: maximum attempts	1..10	3
26	Unsolicited-responses: Global enable/disable. This affects all control ports. This setting (if disabled) takes priority over the selective enable/disable settings (%SC37-%SC42).	0 = disable, 1 = enable	0 (disable)
27	Control port 1, Append <LF> on transmit enable/disable. (COM(R1))	0 = disable, 1 = enable **Note:** This is usually enabled for ease of reading the control data on a terminal screen. However, some external systems may require no <LF> characters to be used. This setting can disable the <LF> character from being transmitted. This note applies below as well.	1 (enable)
28	Control port 2, Append <LF> on transmit enable/disable. (COM(R2))	0 = disable, 1 = enable	1 (enable)
29	Control port 3, Append <LF> on transmit enable/disable. (COM(FP))	0 = disable, 1 = enable	1 (enable)

%SC *i* value	Configuration Item Name	Valid Settings (most values are in decimal, unless otherwise noted)	Default
30	Control port 4, Append <LF> on transmit enable/disable. (internal to TouchscreenPC)	0 = disable, 1 = enable	1 (enable)
32	Control port 6, Append <LF> on transmit enable/disable. (IP (LAN) port)	0 = disable, 1 = enable	1 (enable)
34	Air-filter replacement interval.	Write: 0 = Turn off filter-replacement alarm 1..255 = Replacement interval, in days. **Note:** Writing any value to this setting will also clear the "air filter replacement" alarm status. Read: Return the interval set point	30 (days)
35	Resume after power-failure	0 = System remains in "off" state when AC power is restored after a power-failure. User intervention is required to turn power on using the front-panel pushbutton. 1 = If system is "on", then the system returns to normal full operation when AC power is restored after a power-failure. No user intervention is required. If system is "off" prior to the power-failure, then it will remain "off" when power is restored.	1 (resume operation after power-failure)
36	Report active control-port ID	This command is used to determine which control port is being used to send commands into. The S/W "port-ID" currently being used for this command is returned. For example, sending this command into the COM-R1 will cause a response value of "1". If you send this command into the front-panel serial port, the response value will be "3". **Important note:** This command is useful for helping a control system prevent from allowing serial-port parameter changes on the same port being used to send the commands into. Otherwise – you may end up being locked out of the system.	This is a read-only setting.

%SC *i* value	Configuration Item Name	Valid Settings (most values are in decimal, unless otherwise noted)	Default
37	Unsolicited-responses: Selective enable/disable, Control port 1. (COM(R1))	0 = Disable unsolicited messages for this port. 1 = Enable unsolicited messages for this port.	1 (transmit unsolicited messages)
38	Unsolicited responses: Selective enable/disable, Control port 2. (COM(R2))	0 = Disable unsolicited messages for this port. 1 = Enable unsolicited messages for this port.	1 (transmit unsolicited messages)
39	Unsolicited responses: Selective enable/disable, Control port 3. (COM(FP))	0 = Disable unsolicited messages for this port. 1 = Enable unsolicited messages for this port.	1 (transmit unsolicited messages)
40	Unsolicited responses: Selective enable/disable, Control port 4. (internal port, for TouchscreenPC)	0 = Disable unsolicited messages for this port. 1 = Enable unsolicited messages for this port.	1 (transmit unsolicited messages)
42	Unsolicited responses: Selective enable/disable, Control port 6. (IP (LAN) port)	0 = Disable unsolicited messages for this port. 1 = Enable unsolicited messages for this port.	1 (transmit unsolicited messages)
43	Switch mode: duplex/simplex	0 = Simplex mode. **Note:** Full duplex communication between ports can only be established for 1:1 (point-to-point) connections. 1 = Duplex mode. **Note:** The return-path data channel is handled properly for all 1:1 and 1:n connections, due to extra logic present on the Duplex-I/O board.	
44	Serial Number	(Read only value) The serial Number is a unique 8 digits string assign to the VG-Matrix board.	This is a read-only setting.
45	Switch model	(Read only value) 0 = 160x160, 1 = 48x48	This is a read-only setting.
46	Enable Buzzer	1 = Enable the buzzer when an alarm is active. 0 = Disable the buzzer.	1

%SC *i* value	Configuration Item Name	Valid Settings (most values are in decimal, unless otherwise noted)	Default
47	IP control: User-assigned MAC address	Format: xx:xx:xx:xx:xx:xx This parameter is useful for special IP-control applications involving privately routed or security-enhanced "control networks" which sometimes utilize custom "private" MAC addresses. **USE WITH CAUTION.** **Note:** When this setting is all 0's, the system MAC address reverts back to the factory-defined setting. **Note:** A system-reset is required for any changes to this setting to be effective.	00:00:00:00:00:00 (The factory-defined MAC address is used.)
62	Define all Ethernet Parameters. (Requires switch reboot to take effect)	**Format :** xx:xx:xx:xx:xx:xx,dhcp_en, yy.yy.yy.yy,zz.zz.zz.zz,gg,gg,gg,gg,TelnetPort **Where:** xx:xx:xx:xx:xx:xx User Mac Address (See also %SC47) dhcp_en = 1 for enable DHCP, 0 otherwise (See also %SC12) yy.yy.yy.yy User IP Address (See also %SC13) zz.zz.zz.zz User IP Mask (See also %SC14) gg.gg.gg.gg User IP Gateway (See also %SC15) TelnetPort User Telnet Port (see also %SC19)	
63	Enable current routing autosave	1 = Enable current routing auto save. 0 = Disable current routing auto save.	1

%XX – Cross-point Map Clear

Description	Clear all matrix settings, disconnecting all outputs from all inputs. **Use with caution!**
Command	%XX<CR>
Arguments	None.
Response	OK><CR><LF>
Example	Command: %XX<CR><LF> Response: OK><CR><LF>

%XD - Cross-point Map Display

Description	This command returns the entire system cross-point map.
Command	%XD<CR>>
Arguments	None
Response	*oa,ia*<CR><LF> … *oz,iz*<CR><LF> OK><CR><LF> Where… Is… *oa* First output port number in system. *ia* Input port assigned to output port *oa*. *oz* Last output port number in system. *iz* Input port assigned to output port *oz*. **Note:** Only input/output ports which actually exist in the system will be reported. Outputs with no connected inputs are reported as connecting to input #0.

Example	VG Matrix switch is a VGM-160. Only the first I/O card is installed.
	Ports are connected 1>1, 2>2, 3>3, 4>4. Outputs 6-160 have no input connections assigned to them.
	Command: `%XD0<CR><LF>`
	Response: `1,1<CR><LF>`
	`2,2<CR><LF>`
	`3,3<CR><LF>`
	`4,4<CR><LF>`
	`5,0<CR><LF>`
	`6,0<CR><LF>`
	`7,0<CR><LF>`
	`8,0<CR><LF>`
	`OK><CR><LF>`

%XO - Cross-point Map Display: Query by Output

Description	This command displays the cross-point map routing for a specific output port.
Command	%XO*op***<CR>**
Arguments	Where *op* is the output port number.
Response	*op*,*ip*<CR><LF> OK><CR><LF> Where… Is… *op* Output port number. *ip* Input port assigned to output port *op*. **Note:** Only input/output ports which actually exist in the system will be reported. Outputs with no connected inputs are reported as connecting to input #0.
Example	VG Matrix switch is a VGM-160. Ports are connected 2>1, 3>2. Outputs 3-160 have no input connections assigned to them. Command: `%XO1<CR><LF>` Response: `1,2<CR><LF>` `OK><CR><LF>` Command: `%XO3<CR><LF>` Response: `3,0<CR><LF>` `OK><CR><LF>`

%XI - Cross-point Map Display: Query by Input

Description	This command displays the cross-point map routing for a specific input port.
Command	%XI*ip*<CR>
Arguments	Where *ip* is the input port number.
Response	*ip*,*op*,…*op*<CR><LF> OK><CR><LF> Where… Is… *ip* Input port number. *op*,…*op* List of output ports assigned to input port "ip". **Note:** As there could be many outputs connected to one input, this potentially long list will be broken down to a maximum of 16 output ports per line. Each extra line will begin with the input number again (*ip*) and end with **<CR><LF>**. **Note:** Only input/output ports which actually exist in the system will be reported. Inputs with no connected output are reported as connecting to output #0.
Example	VG Matrix switch is a VGM-160. Ports are connected 2>1, 2>5, 2>31. Input 1 has no outputs connected to it. Command: `%XI1<CR><LF>` Response: `1,0<CR><LF>` `OK><CR><LF>` Command: `%XI2<CR><LF>` Response: `2,1,5,31<CR><LF>` `OK><CR><LF>`

@RO – RS232: Assign the Routing Table

Description	This command assigns the RS232 routing table. When serial data is sent into COM2 on the rear panel of the VG-Matrix switch, this data is then sent over all the ports assigned by the RS232 routing table. This feature can be used only with the Duplex-IO card. All the connections are bidirectional, which means that a remote device can respond with confirmation or status information. **Note:** If more than 1 device responds simultaneously the returned data may be interleaved from the multiple devices and will appear garbled.
Command	@RO*op*,*en***<CR>**
Arguments	Where… Is… *op* Output port number. Range 1 to 160, or according to the max available output port. *en* Enable the COM2 port to be route to the op fiber port. 1=connect. 0=disconnect.
Response	OK><CR><LF>
Example	The COM2 port needs to be connected to the fiber port 1 and 67, and the port 33 needs to be disconnected from the COM2. Command: `@RO1,1<CR><LF>` Response: `OK><CR><LF>` Command: `@RO67,1<CR><LF>` Response: `OK><CR><LF>` Command: `@RO33,0<CR><LF>` Response: `OK><CR><LF>`

%RD – RS232: Display the Routing Table

Description	This command displays the RS232 routing table for the COM2 serial port. All the port connections are displayed.
Command	%RD*op***<CR>**
Arguments	Where *op* is the output port number. Range 1 to 160, or according to the max available output port. If the port is not specified, all the ports will be displayed.
Response	*op*,*en*<CR><LF> OK><CR><LF> Where… Is… *op* Output port number. Range 1 to 160, or according to the max available output port. If the port is not specified, all the ports will be displayed. *en* Enable the COM2 port to be route to the op fiber port. 1=connect. 0=disconnect.
Example	VG Matrix 160 port switch with COM2 port connected on port 3 and request port 3 connection status. Command: %RD3<CR><LF> Response: 3,1<CR><LF> OK><CR><LF>

%RX- RS232: Clear Routing Table

Description	This command clears all the connections in the RS232 routing table.
Command	%RX<CR><LF>
Arguments	None
Response	OK><CR><LF>
Example	Command: %RX<CR><LF> Response: OK><CR><LF> Command: %RX<CR><LF> Response: OK><CR><LF>

%SD- Shutdown the Switch

Description	This command gracefully shuts down the switch. The touchscreen PC will shut down first and finally the backplane. Before the shutdown, all the control ports are notified of the shutdown via an unsolicited message.
Command	%SD0123456789<CR>
Arguments	None
Response	OK><CR><LF>
Example	Command: %SD0123456789<CR> Response: OK><CR><LF> Command: %SD0123456789<CR><LF> Response: OK><CR><LF>

%XS - Cross-point Map: Save Video and RS232 Preset

Description	This command will save all the current video and RS232 mapping of the cross-point in the desired preset memory.
Command	%XS*pn***<CR>**
Arguments	Where *pn* is a preset number from 1 to 16.
Response	OK><CR><LF>
Example	When all the desired ports are configured, this configuration can be saved as the preset 1. Command: %XS1<CR><LF> Response: OK><CR><LF>

%XR - Cross-point Map: Recall Preset

Description	This command will recall all the saved video and RS232 mapping in a preset and apply it a current cross-point setting.
Command	%XR*pn***<CR>**
Arguments	Where *pn* is a preset number from 1 to 16.
Response	OK><CR><LF>
Example	Recall the preset 12. Command: %XR12<CR><LF> Response: OK><CR><LF>

Voyager Matrix Routing Commands

These are general-use routing commands used to create a route between I/O ports. The new route(s) will become active immediately.

If an output is already assigned to an input, it will be re-assigned to the newly specified input. Any outputs already assigned to the specified input will not be affected.

@VO - Route Video Output

Description	This command makes a simplex connection between an input and output port.
Command	@VO*op*,*ip***<CR>**
Arguments	Where… Is… *op* The selected output port number. *ip* The selected input port number. Use "0" (zero) to turn off the selected output.
Response	OK><CR><LF>
Example	Connect output port 1 to input port 2. Command: `@VO1,2<CR>` Response: `OK><CR><LF>` Disconnect output port 5 from any input. Command: `@VO5,0<CR>` Response: `OK><CR><LF>`

#VO - Route Video Output

This command makes a duplex (cross-connected) connection between an input and output port. The command formatting is identical to "@VO", above, except that the first character is "#". Duplex connections actually make 2 simplex connections at the same time – cross-connecting the TX/RX ports of two optical ports. You can make the exact same connections by using two appropriate @VO commands.

@VI - Route Video Input (Simplex connect)

Description	This command makes a simplex connection between a single input and output port. Any other output already assigned to a specified input will not be affected.
Command	@VI*ip*,*op***<CR>**
Arguments	Where… Is… *ip* The selected input port number. *op* The selected output port number. Use "0" (zero) to disconnect the selected input from all currently connected outputs.
Response	OK><CR><LF>
Example	Connect input port 3 to output port 20. Command: `@VI3,20<CR>` Response: `OK><CR><LF>` Disconnect input port 2 from every connected output. Command: `@VI2,0<CR>` Response: `OK><CR><LF>`

#VI - Route Video Input (Duplex cross-connect)

This command makes a duplex (cross-connected) connection between an input and output port. The command formatting is identical to "@VI", above, except that the first character is "#". Duplex connections actually make 2 simplex connections at the same time – cross-connecting the TX/RX ports of two optical ports. You can make the exact same connections by using two appropriate @VI commands.

Voyager Matrix: Salvo Video-switching Commands

The salvo, or "bulk switch" commands are used for making simplex connections between a single input port and a range of output ports. They can also be used to disconnect a range of output ports. The new route(s) will become active immediately.

Notes: If an output is already assigned to an input, it will be re-assigned to the newly specified input. Any outputs already assigned to the specified input will not be affected.

&VI - Salvo Route Video Input by Range

Description	This command makes a simplex connection from a single input port to a range of output ports.
Command	&VI*ip*,*ops*,*ope*<CR>
Arguments	Where… Is… *ip* The selected input port number. Use "0" to disconnect specified outputs from any input. *ops* The output port starting number for the range. *ope* The output port ending number for the range.
Response	OK><CR><LF>
Example	Connect input 2 to output ports 5 through 10. Command: `&VI2,5,10<CR>` Response: `OK><CR><LF>` Turn off outputs 15 through 35. Command: `&VI0,15,35<CR>` Response: `OK><CR><LF>`

Voyager Link: Serial Control

The Voyager links can be used standalone (simply for video extension), or combined with a Voyager VG-Matrix switch, for video signal switching and extension.

As these two distinct products were designed to work together, there are many aspects which are tightly interrelated. Therefore, it's important to know how each works, both separately and together. There are many of serial control, management and data-flow which must be understood.

Important Note: Only Voyager links equipped with 4-port CORE's (VG-TX4, VG-RX4) fully implement the full VLCP control protocol. All Voyager 2-port CORE's (VG-TX2, VG-RX2, CF(S):HDMI-TX, CF(S):HDMI-RX, etc.) implement only the "set receiver address" command and allow basic end-to-end serial communications.

Serial Interface Format

The factory default settings are **9600 Baud, 8 data, no parity, 1 stop bit**. These settings can be changed using VLCP commands or via the MAGui utility program.

Cabling

The RS-232 port on each Voyager link device is hard-wired to look like a "DCE" device.

- Connections to a "DTE" device (PC, control system) will generally require a straight-through cable.
- Connections to a "DCE" device (display, modem, etc.) will generally require a "null-modem" cable or in-line adapter, to swap the TXD/RXD (pins 2 and 3 on the DB9-F connector) signals accordingly.

Functionality

There are two types of RS-232 functionality:

- Simplex-serial
- Duplex-serial

Simplex-serial

The simplest form of RS-232 functionality available with a Voyager link is simplex-serial. In this configuration, a Voyager TX and RX are connected with a simplex fiber (1 fiber strand) will allow RS-232 serial data to flow from the TX to RX. No response-data (from a display) is possible because the interconnecting fiber only allows downstream data flow.

Duplex-serial

By adding a second fiber, a duplex-fiber connection is established between a TX and RX. This enables RS-232 serial data to flow in **both** directions: commands to a display as well as responses from a display. A duplex-fiber connection also enables full support for HDCP-protected HDMI video content.

The factory-default functionality of a Voyager link is to provide a "wire equivalent" connection between TX and RX (simplex or duplex data flow, depending on fiber interconnect). The term "wire equivalent" means the Voyager link will send or receive any data. None of it is trapped or modified in any way. In essence, the serial link is "protocol agnostic".

Device Management

The Voyager TX and RX devices offer a wide range of configuration settings and diagnostic data. These are available through the USB-config port and the RS-232 serial port. This information must be accessible via the serial port because some operating parameters might need to be dynamically changed by an external control-system. For example, the ability to mute the line-level audio coming out of an RX device might be an essential controllable element for an installation. Also, some diagnostic and other system-management information might need to be examined and displayed in some form by the control-system.

Voyager Link Control Protocol (VLCP) Overview

The Voyager links provide "wire equivalent" serial extension. In addition, it's possible to access "command mode" at any serial port and make configuration or parameter changes. The method, and serial commands enabling control of Voyager TX and RX units is called the **Voyager Link Control Protocol** or simply **VLCP**.

The VLCP protocol is modeled after the legacy "AT command" set used by old analog modems. The "AT command" set was chosen as a reference because it is a well understood and reliable protocol. Also, many serial-communication programs are still geared towards this protocol.

Note that VLCP commands can be used at either the TX or RX end of the Voyager link.

Operating Modes

The Voyager link serial-interface is always in one of two modes:

- **Online:** This is the serial pass-through (or "wire equivalent") mode which is in effect most of the time. All user-supplied data to pass between TX and RX unmodified
- **Command:** Serial data is trapped by the TX or RX and processed as VLCP commands. This is the only time with VLCP commands are recognized by a TX or RX.

Entering **Command** mode required transmitting a special "attention-character" sequence into a TX or RX:

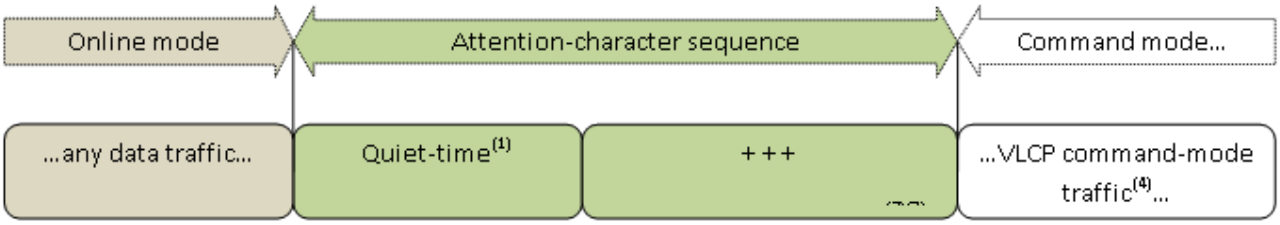


Figure 2. VLCP Operating Modes

Configurable Parameters:

Quiet-time period = 2 Seconds (factory default), adjustable from zero (no timeout) to 25.5 Seconds.

1. Adjustment is in 0.1 Second units.
2. See VLCP configuration register "S4".

Attention character = "+" (factory default). This can be changed to any other character.

1. To avoid problems **do not** use numbers "0" through "9", "@", or <carriage-return> (0x0D).
2. See VLCP configuration register "S5".

Attention timeout = 2 Seconds (factory default), adjustable from 0.1 to 25.5 Seconds.

1. Adjustment is in 0.1 Second units.
2. The attention-character sequence must be completed within this timeout period, or the sequence will be ignored and command-mode will not be activated.
3. See VLCP configuration register "S6".

Command timeout = 2 Minutes (factory default), adjustable from (disabled) to 1275 Seconds (21.25 Minutes).

Adjustment is in 5 Second units.

1. If there is inactivity for the timeout period, the serial interface automatically returns to the "Online" mode.
2. See VLCP configuration register "S7".

To exit **Command**, use the VLCP "*go online*" command, or "O<cr>":

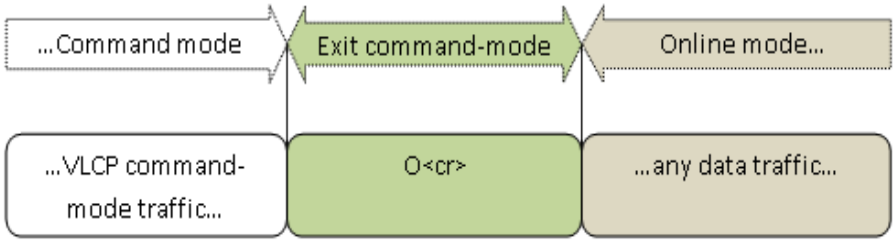


Figure 3. Exiting Command Mode

Voyager Device Addressing: Factory Default

Every Voyager link CORE module carries a factory-programmed serial-number (S/N) identifier, and is used in a manner very similar to how a "MAC address" is used with LAN interfaces.

This S/N is printed on the product-ID label, which is usually located on the bottom of the device. Here is an example of a typical product-ID label:

Figure 4. Product ID Label

The factory default behavior is to provide a "wire equivalent" link between a TX and ALL currently attached RX devices (a 1:n **broadcast** connection). This is the most popular and easiest to use configuration, requiring no special control-system programming. A broadcast connection can also be created by using a receiver address of all zeros, such as "0000000000000000".

However, many applications require a 1:1 connection to allow communication with one specific RX at a time. The "set receiver address" command is used to create a 1:1 connection. The device S/N of the RX must be known by the control system. This command can be used at any time, whether the serial link is in the VLCP **online-mode** or **command-mode**.

Voyager Device Addressing: User Specified

The factory-default S/N (as printed on the product-ID label) can be overridden to a user-specified number. This capability can be **extremely useful** for large systems or complex fan-out/daisy-chained configurations. For example, if an RX node fails, it can be quickly replaced and its address re-configured to have the address (S/N) of the device it replaced.

In large and complex systems, it is strongly advised to always employ user-defined addresses (usually selected by the system designer), so that the control system can be written and tested once. Subsequent Voyager TX/RX replacements wouldn't trigger potentially expensive re-programming of the control system.

To change a Voyager TX or RX address, see VLCP register setting "S8".

Note that it is NOT possible to change a device address to "0000000000000000", because this is reserved as the "broadcast address".

Even when an address has been changed in this manner, it's still possible to query the system to determine the actual system "inventory" and the real S/N's of each device. See VLCP commands "I1" and "I2".

The user-defined addressing mode can be quickly enabled/disabled. See VLCP register setting "S8", parameter value "D" and "U".

Voyager Set-Receiver-Address Command

The "set receiver address" command sequence is transmitted into a TX, as described below:

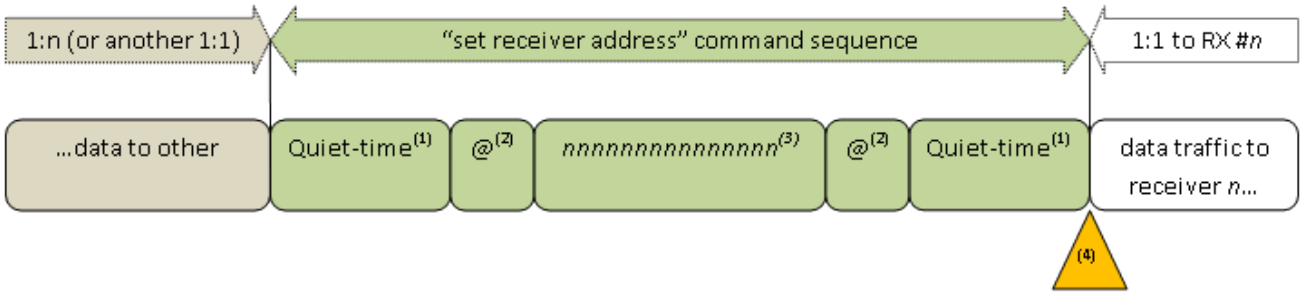


Figure 5. Set Receiver Address Command

Configurable Parameters:

Quiet-time period = 2 Seconds (factory default), adjustable from zero (no timeout) to 25.5 Seconds.

1. Adjustment is in 0.1 Second units.
2. See VLCP configuration register "S1".

Address delimiter = "@" (factory default). This can be changed to any other character.

1. To avoid problems do not use numbers "0" through "9", "+", or <carriage-return> (0x0D).
2. See VLCP configuration register "S2".

Sequence timeout = 2 Seconds (factory default), adjustable from "disabled" to 25.5 Seconds.

1. Adjustment is in 0.1 Second units.
2. The addressing sequence (from first @ to second @) must be completed within this timeout period, or the sequence will be ignored and the receiver-address will not be set.
3. See VLCP configuration register "S3".

Buffered-RX Polling Trigger: IF the addressed receiver is configured for "DUPLEX/buffered-until-polled" (mode-2), the completion of the "set-receiver-address" command will trigger the addressed receiver to immediately transmit any data currently in its RX input buffer. The data is transmitted in raw form (without additional formatting). After transmitting its data, the RX input buffer is automatically cleared. Also refer to VLCP configuration register S25 and S27.

Once the desired receiver address is set in this manner, it persists and remains active even after a power cycle. However, there is a configuration setting which allows the receiver address to revert back to "Broadcast" or "0000000000000000" after a power-cycle (see VLCP configuration register S10).

Using broadcast-mode with multiple DUPLEX receivers (1:2 or 1:n, star or daisy-chain):

In this configuration, all RX devices can talk back to the TX as if there was a direct "wire" connection. This is often a convenient mode of operation, but only if the devices (ex:displays) attached to the RX's have their own addressing scheme. If multiple displays respond simultaneously to a serial command, the data will be interleaved (mixed together) probably rendering it indecipherable to the control system.

VLCP Usage

Remote Control Prefix Character "!"

Most VLCP commands can be also be used as "remote control" commands by simply prefixing the command with the "!" character. In most cases, this is used from the TX end to control one or all attached RX devices (or the reverse). It is also possible to remotely control a TX from the RX end. While this is certainly possible, it tends to be a much less useful feature. However, it is available for those situations that call for it.

Using Device Remote-Control

VLCP commands interact with and directly affect the local device that they are sent into (TX or RX). However, it is also possible to interact with a remote device IF the S/N (address) of that device is known. Use the **"set receiver address"** to select all (broadcast mode) or a specific receiver (1:1 mode) to interact with for remote-control commands.

When using the remote-control feature: If a VLCP command typically generates a response – the response will come from the **far end,** not the local device. This is an important detail because a remote-end response directly confirms two things: 1) The remote end is powered up and probably functioning to a great degree; and 2) The fiber interface between the local and remote end is a DUPLEX (2 fibers) connection, and is intact.

Note that if the current addressing mode is set to "broadcast" or "0000000000000000", then the remote-end receivers will **NOT** respond to a remote-control command. There is no way to coordinate their responses and present them to the control system in an organized manner. In this particular case, it can only be assumed that all receivers actually received and understood the remote-control command.

Command Sequence

Here is the VLCP command sequence:

1. The command itself (usually one or two letters).
2. Parameter (if applicable); multiple parameters are comma-separated.
3. The command line always ends with a <CR> (carriage-return character).

Here are possible device responses:

- Results from the command (if applicable). Multi-line results always end with a <LF><CR> on each line.
- When all the results transmitted and the command is completed, the device transmits an "OK>"<LF><CR> prompt, to indicate the device is ready for another command.
- If there was an error in the command (unrecognized command, or invalid parameter), the device transmits an "ER>"<LF><CR> prompt. This means the previous command failed to execute, and is now ready for the next command.
- If a blank command sequence is used (just a <CR>), this is safely interpreted as a null-command and the device simply responds with the "OK>"<LF><CR> prompt again.

String Format

Some commands involve parameter data in ASCII string format. All string-parameters (when required) should be formatted as follows:

- The entire string must be contained inside a pair of double-quotes (ex: "this is a string").
- Hex values can be embedded in the string (for example, non-printing characters):
    - Hex values within a string are encoded with a backslash (\) and 1 or 2 hex digits:
      "Hello\0d", which translates to the ASCII string **Hello** followed by 0D-hex (<carriage-return> character).
    - The hex-value can be upper or lower case:
      "\0d" and "\0D" are equivalent.
      "\aa" and "\AA" are equivalent.
    - Leading-zeros in the hex value are safely ignored:
      "\0d" and "\d" are equivalent.
- If the string must contain a (\) character, it is encoded as (\\).
  "Hello\\friend\0d", which translates to the ASCII string **Hello\friend** followed by 0D-hex (<carriage-return> character).
- If the string must contain a (") character, it is encoded as: (\').
  "Hello\'friend\'\0d", which translates to the ASCII string **Hello "friend"** followed by 0D-hex (<carriage-return> character).

CAUTION: Hex values **can** be expressed with a single character (like "\d"), but if there is a character following it that is 0-9 or A-F (or a-f) it will be erroneously interpreted as part of the hex field. If the hex value is at the end of the string (like "XYZ\d") then it is always safe to use a single digit. To avoid problems, it's recommended to always express hex values using 2 digits.

Device Settings Volatility

For any commands which change configuration or operational settings in a device, the new settings are immediately saved and persist even after a power-cycle of the device.

VLCP General Commands

O – Go Online

Description	Leave command-mode on enter online-mode.
Command	O<CR>
Arguments	None
Response	None
Example	Command: `O<CR>`

R – Read Buffer

Description	Read buffered serial data.
Command	R<CR>
Arguments	None
Response	*TBD*
Example	Command: `R<CR>` Response: `16,ABCDEFGHIJKLMNO\1B<CR>`

Q – Quiet Mode

Description	This command sets quiet mode.
Command	Q*mode*<CR>
Arguments	Where… Is… *mode* 0 = normal operation, command responses are transmitted. 1 = command responses are suppressed.
Response	None
Example	Command: `Q1<CR>`

E – Character Echo

Description	Enable local echo of received characters.
Command	E*mode*<CR>
Arguments	Where… Is… *mode* 0 = disable echo 1 = enable echo
Response	*state*<CR> Where *state* is: 0 = disable echo 1 = enable echo
Example	Command: `E?<CR>` Response: `E0`

L – Lock Panel Buttons

Description	Lock the front-panel buttons.
Command	L*mode*<CR>
Arguments	Where… Is… *mode* 0 = disable lock 1 = enable lock
Response	*state*<CR> Where *state* is 0 = disable lock 1 = enable lock
Example	Command: `L?<CR>` Response: `0<CR>`

C – Control EDID Management

Description	Controls EDID management and selects EDID profile to use.
Command	C*mode*<CR>
Arguments	Where… Is… *mode* 0 = Use Magenta Magic profile, TX only 1 = Use EDID profile from local-port display, TX only 3 = Use EDID from last "pushed" receiver, TX only 4 = Push EDID, RX only
Response	OK><CR>
Example	Command: `C0<CR>` Response: `OK><CR>`

P – Video Optical Port Selection

Description	Select the optical port used as the video source. This option can only be used on an Rx device.
Command	P*port*<CR>
Arguments	Where… Is… *port* 0 = automatic port selection 1 = optical port #1 is selected 2 = optical port #2 is selected 3 = optical port #3 is selected (4-port CORE only) 4 = optical port #4 is selected (4-port CORE only)
Response	None
Example	Command: P?<CR> Response: 2<CR>

V - Video Mute

Description	Mute the video content with the optional specified color. Get the mute status.
Command	V*mode*[,*red*,*green*,*blue*]<CR>
Arguments	Where… Is… *mode* 0 = normal operation, do not accept color info 1 = video is muted 2 = video and HDMI audio are muted *red* 0 to 255 (set the color component value) *green* 0 to 255 (set the color component value) *blue* 0 to 255 (set the color component value)
Response	None
Example	Command: V?<CR> Response: 1,127,127,0<CR>

Z – Reset Device

Description	Reset the device.
Command	Z*mode*<CR>
Arguments	Where… Is… *mode* 0 = reset S settings 1 = reset S settings and serial port settings 2 = reset the device physically 3 = reset audio settings only 4 = reset video settings only **Note:** Pressing F1 on the front panel while connecting DC power will trigger a Z1 reset.
Response	None
Example	Command: Z1<CR>

TN – Audio Tone Testing

Description	Enable the audio tone on all channels. This testing option can be used on both a Tx and an Rx device. The tone setting is not saved.
Command	TN?<CR>
Arguments	None
Response	*enable*<CR> Where… Is… *enable* 0 = tone is disabled 1 = tone is enabled on all channels
Example	Command: TN?<CR> Response: 0<CR>

GI – Audio Analog Gain Control

Description	Set line-in/line-out audio gain settings. GI can only be used on a Tx device.
Command	GI?
Arguments	None
Response	GI*channel,gain*<CR> Where… Is… *channel* L = left channel is affected R = right channel is affected B = both channels are affected *gain* 1 to 32 + = increase the gain - = decrease the gain M or 0 = mute U = un-mute T = toggle mute
Example	Command: GI?<CR> Response: GIB,U,27,U,27<CR>

GO – Audio Analog Gain Control

Description	Set line-in/line-out audio gain settings. GO can only be used on an Rx device.
Command	GO*channel*,*gain*<CR>
Arguments	Where… Is… *channel* L = left channel is affected R = right channel is affected B = both channels are affected *gain* 1 to 80 + = increase the gain - = decrease the gain M or 0 = mute U = un-mute T = toggle mute
Response	None
Example	Command: GOL,26<CR> (set left out channel's level to 26) Usage: GO?<CR> Response: GOB,mute_left,gain_left,mute_right,gain_right<CR> Ex: GO?<CR> GOB,M,10,M,10<CR>

MI – Audio Channel Mapping

Description	Map an input audio channel to an output audio channel. This option can only be used on a Tx device.
Command	MI*hfl*,*hfr*,*hs*,*hc*,*hsl*,*hsr*,*hsbl*,*hsbr*,*al*,*ar*<CR>
Arguments	Where… Is… *hfl* to *ar* 1 = HDMI Front Left 2 = HDMI Front Right 3 = HDMI Subwoofer 4 = HDMI Center 5 = HDMI Surround Left 6 = HDMI Surround Right 7 = HDMI Surround Back Left 8 = HDMI Surround Back Right 9 = Analog Left A = Analog Right M = Mute
Response	None
Example	Ex: MI1,2,3,4,5,6,7,8,9,A<CR> (default mapping) Ex: MI1,2,3,4,5,6,7,8,M,M<CR> (mute Analog channels) Ex: MIM,M,M,M,M,M,M,M,9,A<CR> (mute HDMI channels) Ex: MI9,A,M,M,M,M,M,M,9,A<CR> (map Analog channels to HDMI) Usage: MI?<CR> Response: hfl,hfr,hs,hc,hsl,hsr,hsbl,hsbr,al,ar<CR> Ex: MI?<CR> 9,A,M,M,M,M,M,M,9,A<CR>

SO – Audio Optical Port Selection

Description	Select the optical port used as the audio source. This option can only be used on a Rx device.
Command	SO*port*<CR>
Arguments	Where… Is… *port* 0 = automatic - follow video 1 = optical port 1 2 = optical port 2 3 = optical port 3 (4-port CORE only) 4 = optical port 4 (4-port CORE only)
Response	None
Example	Ex: SO0<CR> (audio follow video) Ex: SO3<CR> (use audio channels from optical port 3) Usage: SO?<CR> Response: port<CR> Ex: SO?<CR> 3<CR>

AO – Audio Analog Out Settings

Description	Set the Analog audio out settings. This option can only be used on an Rx device.
Command	AOchannels<CR>
Arguments	Where… Is… Channels 1 = Analog stereo 2 = HDMI stereo downmix 3 = HDMI Front 4 = HDMI Subwoofer/Center 5 = HDMI Surround 6 = HDMI Surround Back
Response	None
Example	Ex: AO1<CR> (default channels) Ex: AO2<CR> (HDMI stereo downmix) Usage: AO?<CR> Response: channels<CR> Ex: AO?<CR> 2<CR>

HO – Audio HDMI Out Settings

Description	Set the HDMI audio out settings. This option can only be used on an Rx device.
Command	HO*channels*,*data_width*,*sampling_rate*<CR>
Arguments	Where… Is… *channels* 1 = automatic from EDID 2 = HDMI stereo 2.0 3 = HDMI surround 5.1 4 = HDMI surround 7.1 5 = Analog stereo 2.0 *data_width* 1 = automatic from EDID 2 = 16 bits 3 = 20 bits 4 = 24 bits *sampling_rate* 1 = automatic from EDID 2 = 32 kHz 3 = 44 kHz 4 = 48 kHz
Response	None
Example	Ex: HO1,1,1<CR> (default settings) Ex: HO5,4,4<CR> (Analog stereo, 24 bits, 48 kHz) Usage: HO?<CR> Response: channels,data_width,sampling_rate<CR> Ex: HO?<CR> 5,4,4<CR>

I – Device Information

I0 – Get Device Name

Description	This command gets the device name.
Command	I0<CR>
Arguments	None
Response	"device_name"<CR> Where *device_name* is the device identifier.
Example	Command: `I0<CR>` Response: `"VGTX2-HDMI-ISA"<CR>`

I1 – Get Device Physical Address

Description	This command gets the physical address.
Command	I1<CR>
Arguments	None
Response	"physical_address"<CR> Where *physical_address* is the device address.
Example	Command: `I1<CR>` Response: `1122334455667788<CR>`

I2 – Get Device Physical and User Addresses

Description	This command gets the physical and user address.
Command	I2<CR>
Arguments	None
Response	"*physical_address*,*user_address*"<CR> Where… Is… *physical_address* The device address. *user_address* The user address.
Example	Command: `I2<CR>` Response: `1122334455667788,8877665544332211<CR>`

I3 – Get CRC of the Video Data Path

Description	This command gets the CRC of the video data path.
Command	I3<CR>
Arguments	None
Response	*xx*,*yy*,*zz*<CR> Where… Is… xx ?? *yy* ?? zz ??
Example	Command: `I3<CR>` Response: `AC,12,03<CR>`

I5 – Get Device Firmware Version

Description	This command gets the device firmware version.
Command	I5<CR>
Arguments	None
Response	"*firmware_version*"<CR> Where *firmware_version* is the version number of the device firmware.
Example	Command: `I5<CR>` Response: `"V1.1.40.0066"<CR>`

I6 – Get Device Optical Link Status

Description	This command gets the device optical link status.
Command	I6,*port*<CR>
Arguments	Where *port* = 1, 2, 3, or 4.
Response	*port*,*tx_status*,*rx_status*<CR> Where… Is… *port* Port index, same as port parameter. *tx_status* 0 = SFP module not detected 1 = SFP Tx fault 2 = PCS Tx is idle 3 = PCS Tx transmitting video 4 = PCS Tx transmitting management data 5 = PCS Tx transmitting video and management data *rx_status* 0 = SFP module not detected 1 = SFP Rx no signal detected 2 = PCS Rx is idle 3 = PCS Rx receiving video 4 = PCS Rx receiving management data 5 = PCS Rx receiving video and management data
Example	Command: `I6,1<CR>` Response: `1,3,4<CR>`

I7 – Get Device Video Status

Description	This command gets the device video status.
Command	I7,*port*<CR>
Arguments	Where… Is… *port* 0 = HDMI/DVI input 1 = HDMI/DVI local output 2 = HDMI/DVI remote output
Response	*port*,*res_hor*,*res_ver*,*refresh*,*bpp*,*scan_mode*,*scaling*,*type*<CR> Where… Is… *port* port index, same as port parameter *res_hor* horizontal resolution (pixels) *res_ver* vertical resolution (pixels) *refresh* period of the vertical refresh x 1006 (sec.) *bpp* bits-per-pixel *scan_mode* 0 = progressive 1 = interlaced *scaling* 0 = no scaling 1 = fill 2 = zoom *type* 0 = HDCP is not required 1 = HDCP is required
Example	Command: `I7,2<CR>` Response: `2,1920,1080,1666560,24,0,0,1<CR>`

I8 – Read EDID Contents

Description	This command reads contents of EDID.
Command	I8,*n*<CR>
Arguments	Where… Is… *n* 0 = Magenta Magic EDID 1 = Local EDID (TX only) 3 = remote EDID (RX only) 4 = Dump stored EDID (TX only) is the source of EDID data for dumping out.
Response	EDID DATA<CR> OK><CR>
Example	Command: I8,0<CR> Response: 0000:128923098AB2334D83498C98A34F0011A4CD00239889ED094309FA0923A1AA55<CR> 0020:128923098AB2334D83498C98A34F0011A4CD00239889ED094309FA0923A1AA55<CR> ... 00C0:128923098AB2334D83498C98A34F0011A4CD00239889ED094309FA0923A1AA55<CR> 00E0:128923098AB2334D83498C98A34F0011A4CD00239889ED094309FA0923A1AA55<CR>

I9 – Read LED Buttons Status

Description	This command reads the status of the LED buttons.
Command	I9<CR>
Arguments	*f1,f2,a,b,c*<CR>
Response	Where… Is… *f1,f2* F1 and F2 button status: 0 = not pressed 1 = pressed *a,b,c* Status of front panel LEDs: 0 = Off 1 = Green 2 = Green-flashing 3 = Amber 4 = Amber-flashing 5 = Red-flashing
Example	Command: `I9<CR>` Response: `0,0,1,1,1<CR>`

I10 – Get System Status

Description	This command gets the system status.
Command	I10<CR>
Arguments	None
Response	*status*<CR> Where *status* is either: 0 = no issue to report, 1 = no video, or 2 = HDCP is required but device is not authenticated.
Example	Command: `I10<CR>` Response: `2<CR>`

I11 – Get Attached Monitor Name

Description	This command gets the attached monitor name.
Command	I11,*port*<CR>
Arguments	None
Response	"*monitor_name*"<CR> Where *monitor_name* is the monitor identifier.
Example	Command: `I11,1<CR>` Response: `"DELL U2410"<CR>`

VLCP S-Registers: Address, Command, Device Configuration

S1 – Quiet Time for Set-Receiver-Address Command

Description	This command gets the attached monitor name.
Command	S1,*n*<CR> for write S1<CR> for read
Arguments	Where *n* = 0 To 255 (Quiet time in 0.1s unit)
Response	Value<CR>
Example	Command: `S1,20<CR>` `S1<CR>` Response: `20<CR>`

S2 – Set "Set-Receiver-Address" Command Address Delimiter Char

Description	This command set command address delimiter char.
Command	S2,*cccc*<CR> for write S2<CR> for read
Arguments	Where *cccc* = 1 To 4 (Quiet time in 0.1s unit)
Response	Value<CR>
Example	Command: `S2,&&<CR>` `S2<CR>` Response: `&&<CR>`

S3 – Execution Timeout for "Set-Receiver-Address" Command

Description	This command set command address delimiter char.
Command	S3,*n*<CR> for write S3<CR> for read
Arguments	Where *n* = 0 To 255 (Timeout in 0.1s unit)
Response	Value<CR>
Example	Command: `S3,20<CR>` `S3<CR>` Response: `20<CR>`

S4 – Quiet Time for "Command-Mode" Sequence

Description	This command set command address delimiter char.
Command	S4,*n*<CR> for write S4<CR> for read
Arguments	Where *n* = 0 To 255 (Timeout in 0.1s unit)
Response	*value*<CR>
Example	Command: S4,20<CR> S4<CR> Response: 20<CR>

S5 – Set "Command Mode" Attention Char

Description	This command set command attention character.
Command	S5,*cccc*<CR> for write S5<CR> for read
Arguments	Where *cccc* = 1 to 4 chars
Response	*chars*<CR>
Example	Command: S5,&&<CR> S5<CR> Response: &&<CR>

S6 – Execution Timeout for "Command Mode" Sequence

Description	This command sets the execution timeout.
Command	S6,*n*<CR> for write S6<CR> for read
Arguments	Where *n* = 0 To 255 (Quiet time in 0.1s unit)
Response	*value*<CR>
Example	Command: S6,20<CR> S6<CR> Response: 20<CR>

S7 – Command Mode Idle Timeout

Description	This command sets the idle timeout.
Command	S7,*n*<CR> for write S7<CR> for read
Arguments	Where *n* = 0 To 255 (Quiet time in 0.1s unit)
Response	*value*<CR>
Example	Command: S7,5<CR> S7<CR> Response: 5<CR>

S8 – Set Device Address

Description	This command sets the device address.
Command	S8,*n*<CR> for write S8<CR> for read
Arguments	Where *n* = D (Use factory default address, that is S/N) or U (Use the user specified address)
Response	*address*<CR>
Example	Command: `S8,D<CR>` `S8<CR>` Response: `0123456789ABCDEF<CR>`

S10 – Sticky-Receiver-Address Control

Description	This command sets the sticky receiver address control.
Command	S10,*n*<CR> for write S10<CR> for read
Arguments	Where *n* = 0 (Receiver address is reset to broadcast after power cycle) or 1 (The last "set-receiver-address" sequence is remembered after a power cycle)
Response	*value*<CR>
Example	Command: `S10,0<CR>` `S10<CR>` Response: `0<CR>`

VLCP S-Registers: Serial Port Configuration

S20 – Serial Port Format

Description	This command sets the serial port format.
Command	S20,*a*,*b*,*c*,*d*<CR> for write S20<CR> for read
Arguments	Where… Is… *a* Baud Rate *b* Data Length (7 or 8 bits) *c* Parity (0 none, 1 odd, 2 even) *d* Stop bit width (1 or 2 bits)
Response	*config*<CR>
Example	Command: `S20,9600,8,0,1<CR>` `S20<CR>` Response: `9600,8,0,1<CR>`

S24 – Serial Port Format <LF> Control

Description	This command sets the serial port format control.
Command	S24,*n*<CR> for write S24<CR> for read
Arguments	Where *n* = 0 to disable use of <LF> or 1 to enable use of <LF>
Response	*value*<CR>
Example	Command: `S24,0<CR>` `S24<CR>` Response: `0<CR>`

S25 – Serial Port Duplex Control

Description	This command sets the serial port duplex control.
Command	S25,*n*<CR> for write S25<CR> for read
Arguments	Where… Is… *n* 0 = Normal full-duplex 1 = Ignore RX (input) data traffic and don't buffer 2 = Buffer Rx (input) data traffic until polled with "set-receiver-address" sequence 3 = Buffer Rx (input_ data traffic untiol polled with VLCP "R" command
Response	*value*<CR>
Example	Command: `S25,0<CR>` `S25<CR>` Response: `0<CR>`

S27 – Set Unselected RX Behavior

Description	This command sets the unselected RX behavior.
Command	S27,*n*<CR> for write S27<CR> for read
Arguments	Where… Is… *n* 0 = Ignore incoming serial data from attached device 1 = Buffer Rx (input) data traffic until polled with "set-receiver-address" sequence 2 = Buffer Rx (input_ data traffic untiol polled with VLCP "R" command
Response	*value*<CR>
Example	Command: `S27,0<CR>` `S27<CR>` Response: `0<CR>`

SC – Scaler Configuration

SC – Scaler Mode Information

Description	This command gets the scaler mode configuration.
Command	SC*cmd*<CR>
Arguments	Where… Is… *cmd* c = Read all Scaler configuration registers m = Read Scaler mode a = Read automatic mode flag d = Display available mode v = Display scaler version registers
Response	*configuration*<OK>
Example	Command: SCm<CR> Response: 27<OK>

Write Scaler Mode

Description	This command sets the scaler configuration.
Command	SC*cmd*,a<CR>
Arguments	Where… Is… *cmd* m = Write Scaler mode
Response	*configuration*<OK>
Example	Command: SCm,a<CR> Response: SCm,27

Write Scaler Register

Description	This command sets the scaler configuration.
Command	SC*cmd*,a,b<CR>
Arguments	Where… Is… *cmd* w = Write Scaler register a with value b
Response	None
Example	Command: SCw,1,1

Index

About this manual, 1
Automatic restart feature, 11
Character abbreviations, 4
Command execution, 12
Command format, 13
Command overview, 12
Configurations, 5
Contact information, iv
Control ports-IDs, 10
Critical faults, 11
Extended response format, 15
General commands
  %D10, 24
  %DG, 26
  %DG0, 26
  %DG1, 27
  %DG2, 27
  %DG3, 28
  %DG4, 28
  %DG5, 29
  %DI1, 25
  %DI2, 25
  %RD, 40
  %RE, 20
  %RX, 40
  %SC item codes, 31
  %SC read setting, 30
  %SC write setting, 30
  %SD, 41
  %SG0, 23
  %SG1, 23
  %SG3, 24
  %SI, 22
  %ST, 21
  %XD, 37
  %XI, 38
  %XO, 38
  %XR, 41
  %XS, 41
  %XX, 36
  @RO, 39
Major faults, 11
Ports, 2
Power-down, 17
Power-up, 17
Precautions, iii
Routing commands
  #VI, 43
  #VO, 42
  @VI, 43
  @VO, 42
Salvo video-switching command, 44
Serial interface parameters, 4
Slot assignments, 5
Standard command responses, 15
Switch I/O ports, 14
Unsolicted responses, 16
VG-Matrix 160
  front panel, 8
  rear panel, 9
VG-Matrix 48
  front panel, 6
  rear panel, 7
Video extension links, 2
Video matrix switches, 2
VLCP
  command sequence, 51
  command usage, 50
  factory defaults, 48
  operating modes, 47
  overview, 46
  set receiver address command, 49
  string formats, 51
VLCP device information
  I0, 58
  I1, 58
  I10, 61
  I11, 62
  I2, 59
  I3, 59
  I5, 59
  I6, 60
  I7, 60
  I8, 61
  I9, 61
VLCP general commands
  0, 52
  AO, 57
  C, 53
  E, 53
  GI, 55
  GO, 56
  HO, 58
  L, 53
  MI, 56
  P, 54
  Q, 52
  R, 52
  SO, 57
  TN, 55
  V, 54
  Z, 54
VLCP scaler configuration
  scaler mode information, 66
  write scaler mode, 66
  write scaler register, 66
VLCP S-receivers
  S10, 64
  S2, 62
  S3, 62
  S4, 63
  S5, 63
  S6, 63
  S7, 63
  S8, 64
VLCP S-registers
  S1, 62
  S20, 64

S24, 65
S25, 65
S27, 65
Voyager links, 45