

Serial Protocol of VZ-C11 and VZ-C30

No: **T-04/05**

Revised 25th September / AR

Introduction

The VZ-C11 and VZ-C30 can be controlled via the RS-232-port by a computer or a control-system. It is possible to perform all functions of the IR-remote-control such as Zoom, Focus, Presets, etc. as well as a lot of other functions like reading and setting zoom-position, etc. The protocol is upward compatible to the one of the VZ-27plus/57plus expect arm functions.

Connection

The serial-port of the Visualizers is a standard 9-pin-Sub-D-connector, which can be found on most computers too. Only pin 2 (RxD), 3 (TxD) and 5 (GND) must be connected. The baud rate is (by default) 19200. There is no parity, 8 data-bits and 1 stop-bit.

Changing the Baud rate

It is possible to change the baud rate from 19200 to 9600, 38400 or 115200. To change the baud rate, switch the unit on and press MENU-key for four seconds, until the Extra-Menu appears. Then enter the Serial Port-sub-menu. There you can change the baud rate.

Control-Commands

The controlling of the Visualizer is done by sending codes (each code is 1 byte) to the Visualizer: these codes perform the desired action. There is no need for Carriage Return, Linefeed or similar. By default the Visualizer doesn't respond to the commands on the serial-port (except commands which return status-information like zoom-position or Get Light on/off, etc.). With special commands this behavior can be changed so that the Visualizer sends a reply after each command (for details see "Reply Mode Control"). Some commands have a quiet long execution time therefore you shouldn't send different codes immediately one after another. If you want to check if the Visualizer is ready to receive new commands, you can send code 32 (' ') until the unit answers with 32 (' ') (Blank Echo). While the unit is not ready, there is no answer.

If you want to test the commands with a terminal-program, you may prefer to enter the commands as ASCII-text. To do so, press underscore ('_'), the Visualizer will respond with a question mark. Then enter the 3 digit decimal number within three seconds. The command will then be performed (e.g. type '_ '2' '0' '0' for Power On or '_ '0' '4' '9' to select command page 1).

In the following tables you will find the decimal and the hexadecimal codes. The dollar-sign ('\$') in front of the numbers indicates that the respective number is a hexadecimal number. The dollar-sign must not be sent.

Custom Serial Mode

The manual Height adjustment can be performed via RS-232 (since firmware v1.30a, Custom Serial Mode - see page 11). The RS-232 control is very similar to the IR-remote control. The first time the unit is switched on, the height adjustment will start automatically. The Height Adjustment can be aborted with the command _206 (Visualizer Menu on/off) every time.

- Step 1: Center Lightfield (coarse)
Center the lightfield with the commands _210 (Data Right), _211 (Data Left), _208 (Function Up) and _209 (Function Down). Confirm the lightfield position with the command _214 (Help).
- Step 2: Adjust Camera Focus
Adjust the camera focus with the commands _194 (Focus Far), _198 (Focus Near) or _131 (Start Focus Far), _132 (Start Focus Near) and _128 (Stop Focus). Confirm camera focus setting with the command _214 (Help).
- Step 3: Adjust Light Focus
Adjust the light focus with the commands _194 (Focus Far), _198 (Focus Near) or _131 (Start Focus Far), _132 (Start Focus Near) and _128 (Stop Focus). Confirm light focus setting with the command _214 (Help).
- Step 4: Center Lightfield (fine)
Center the lightfield with the commands _210 (Data Right), _211 (Data Left), _208 (Function Up) and _209 (Function Down). Confirm the lightfield position with the command _214 (Help).

Every step-name will be output to the computer via RS-232 (i.e. "Center Lightfield" + line feed + carriage return). When the Height Adjustment is completed, the Visualizer sends "Height Adjustment Done" (+ line feed + carriage return) to the computer. For more information regarding Height Adjustment, please read the installation manual of your Ceiling Visualizer (<http://www.wolfvision.com/wolf/techinfo.html>).

Page-Commands

The commands are split into two pages (because for one command-page there are too many commands exist). Basically each command is a two Byte command, page-command + control-command.

If the command-reply mode is switched on, then the Visualizer sends a reply for each Byte, a reply for the control-command and also for the page-command (for details see "Reply Mode Control").

The standard command page is "0", that means, if you want to execute a command from the page "0" (standard page), then it's not necessary to select the page "0" before. If you want to execute a command from the page "1" then you must select the page "1" and input now your command.

If the page "1" command is executed, then the Visualizer switches automatically back to the page "0".

Check "Page" column for command page in the following tables.

Select Page Control

| Page | Dec. Code | Hex. Code | Command | Description | see Notes |
|------|-----------|-----------|-----------|---|-----------|
| 0 | 048 | \$30 | SER_Page0 | By sending this command the Visualizer switches to the page "0" and waits for the control command. Page "0" is the standard page and it is not necessary to select it | |
| 0 | 049 | \$31 | SER_Page1 | By sending this command the Visualizer switches to the page "1" and waits for the control command. After the control command is executed (i.e. 136 for Show All) the Visualizer changes back to the standard page (page 0) | |

Zoom Control

| Page | Dec. Code | Hex. Code | Command | Description | see Notes |
|------|-----------|-----------|----------------------|--|-----------|
| 0 | 195 | \$C3 | Zoom wide | By sending this command the Visualizer zooms towards wide-position. For continuous zooming send this code repetitively (min. 10Hz) as long as you want to zoom. | 1 |
| 0 | 199 | \$C7 | Zoom tele | By sending this command the Visualizer zooms towards tele-position. For continuous zooming send this code repetitively (min. 10Hz) as long as you want to zoom. | 1 |
| 0 | 129 | \$81 | Start Zoom wide | This command starts to zoom towards the wide-position. The Visualizer zooms until the „Stop Zoom/Focus/Iris“-command or a different Start-Command is received (or the mechanical end-position is reached). | 1 |
| 0 | 130 | \$82 | Start Zoom tele | This command starts to zoom towards the tele-position. The Visualizer zooms until the „Stop Zoom/Focus/Iris“-command or a different Start-Command is received (or the mechanical end-position is reached). | 1 |
| 0 | 128 | \$80 | Stop Zoom/Focus/Iris | This command stops zooming, focusing and iris (if activated with the respective „Start xxx“-command before). | |
| 0 | 161 | \$A1 | Get Zoom-Position | After sending this command the Visualizer sends back the current zoom-position as a 3-digit hexadecimal number in the range from '000' (wide) to 'FFF' (tele) as an ASCII-string followed by LF and CR. | 2, 3 |
| 0 | 162 | \$A2 | Set Zoom-Position | After this command the Visualizer echoes a question-mark ('?') with no LF and CR. After this question mark the controller should send the wished zoom-position as 3-digit hexadecimal number in the range from '000' (wide) to 'FFF' (tele) within max. 3 seconds. No CR or LF is needed. After receiving the 3rd digit the Visualizer zooms to this position. | 2, 3 |
| 1 | 163 | \$A3 | Set Digital Zoom | After this command the Visualizer echoes a question-mark ('?') with no LF and CR. After this question mark the controller should send the wished digital zoom-position as 3-digit hexadecimal number in the range from '000' (wide) to 'FFF' (tele) within max. 3 seconds. No CR or LF is needed. After receiving the 3rd digit the Visualizer zooms to this position. | 3 |
| 1 | 164 | \$A4 | Get Digital Zoom | After sending this command the Visualizer sends back the current digital zoom-position as a 3-digit hexadecimal number in the range from '000' (wide) to 'FFF' (tele) as an ASCII-string followed by LF and CR. | 3 |

Focus Control

| Page | Dec. Code | Hex. Code | Command | Description | see Notes |
|------|-----------|-----------|----------------------|--|-----------|
| 0 | 194 | \$C2 | Focus far | By sending this command the Visualizer focuses towards far. For continuous changing the focus, send this code repetitively (min. 10Hz) as long as you want to change the focus. | |
| 0 | 198 | \$C6 | Focus near | By sending this command the Visualizer focuses towards near. For continuous changing the focus, send this code repetitively (min. 10Hz) as long as you want to change the focus. | |
| 0 | 131 | \$83 | Start Focus far | This command starts to focus towards far. The Visualizer changes the focus until the „Stop Zoom/Focus/Iris“-command or a different Start-Command is received (or the mechanical end-position is reached). | |
| 0 | 132 | \$84 | Start Focus near | This command starts to focus towards near. The Visualizer changes the focus until the „Stop Zoom/Focus/Iris“-command or a different Start-Command is received (or the mechanical end-position is reached). | |
| 0 | 128 | \$80 | Stop Zoom/Focus/Iris | This command stops zooming, focusing, iris and mirror-movement (if activated with the respective „Start xxx“-command before). | |
| 0 | 163 | \$A3 | Get Focus-Position | After sending this command the Visualizer sends back the current focus-position as a 3-digit hexadecimal number in the range from '000' (near) to 'FFF' (far) as an ASCII-string followed by LF and CR. | 2, 3 |
| 0 | 164 | \$A4 | Set Focus-Position | After this command the Visualizer echoes a question-mark ('?') with no LF and CR. After this question mark the controller should send the wished focus-position as 3-digit hexadecimal number in the range from '000' (near) to 'FFF' (far) within max. 3 seconds. No CR or LF is needed. After receiving the 3rd digit the Visualizer moves to this position. | 2, 3 |
| 0 | 249 | \$F9 | One-Push Auto Focus | By sending this command the Visualizer performs a one-push auto focus. | 4 |

Iris Control

| Page | Dec. Code | Hex. Code | Command | Description | see Notes |
|------|-----------|-----------|---------------------------------|---|------------|
| 0 | 193 | \$C1 | Iris open / Brightness up | By sending this command the Visualizer opens the iris. For continuous opening the iris, send this code repetitively (min. 10Hz) as long as you want to open iris. | 5, 6 |
| 0 | 197 | \$C5 | Iris close / Brightness down | By sending this command the Visualizer closes the iris. For continuous closing the iris, send this code repetitively (min. 10Hz) as long as you want to close iris. | 5, 6 |
| 0 | 133 | \$85 | Start Iris open | This command starts to open the iris. The Visualizer opens the iris until the „Stop Zoom/Focus/Iris“-command or a different Start-Command is received (or the mechanical end-position is reached). | 5, 6 |
| 0 | 134 | \$86 | Start Iris close | This command starts to close the iris. The Visualizer closes the iris until the „Stop Zoom/Focus/Iris“-command or a different Start-Command is received (or the mechanical end-position is reached). | 5, 6 |
| 0 | 128 | \$80 | Stop Zoom/Focus/Iris | This command stops zooming, focusing, iris and mirror-movement (if activated with the respective „Start xxx“-command before). | |
| 0 | 167 | \$A7 | Auto Iris on | Switches the Auto Iris on. | |
| 0 | 168 | \$A8 | Auto Iris off | Switches the Auto Iris off. | |
| 0 | 166 | \$A6 | Get Auto Iris | This function returns '1'+LF +CR if the Auto Iris is switched on and '0'+LF +CR if the Auto Iris is switched off. | 3 |
| 0 | 165 | \$A5 | Get Iris-Position | After sending this command the Visualizer sends back the current iris-position as a 3-digit hexadecimal number in the range from '000' (close) to 'FFF' (open) as an ASCII-string followed by LF and CR. | 2, 3, 5 |
| 0 | 169 | \$A9 | Set Iris-Position | After this command the Visualizer echoes a question-mark ('?') with no LF and CR. After this question mark the controller should send the wished iris-position as 3-digit hexadecimal number in the range from '000' (close) to 'FFF' (open) within max. 3 seconds. No CR or LF is needed. After receiving the 3rd digit the Visualizer moves to this position. | 2, 3, 5, 6 |

Light On/Off Control

| Page | Dec. Code | Hex. Code | Command | Description | see Notes |
|------|-----------|-----------|---------------------|---|-----------|
| 0 | 205 | \$CD | Light off | By sending this command the Visualizer switches the light off. | |
| 0 | 178 | \$B2 | Light on | This command switches the light on. | |
| 0 | 172 | \$AC | Get Light on or off | This function returns '1'+LF +CR if the light is switched on and '0'+LF +CR if the light is switched off. | 3 |
| 0 | 177 | \$B1 | Lampchange | This command changes the lamp and replies "Perform Lampchange... Changed to Lamp 1" (or lamp 2). | 7 |

Power / Presets Control

| Page | Dec. Code | Hex. Code | Command | Description | see Notes |
|------|-----------|-----------|----------------------------|---|--------------|
| 0 | 200 | \$C8 | Power on / Factory-Preset | If the Visualizer is in standby-mode, the unit is switched on. Then the factory-preset is recalled (even if the unit was already switched on). (approx. DIN A5, Light on) | 8, 9, 10, 11 |
| 0 | 201 | \$C9 | Power off | This command puts the unit in standby-mode (camera, light, etc. are switched off). | |
| 0 | 171 | \$AB | Get Power on or off | This function returns '1'+LF +CR if the power is switched on and '0'+LF +CR if the unit is in standby-mode. | 3 |
| 0 | 186 | \$BA | Power toggle switch | By sending this command the Visualizer switches on if it is off, or switches off if the Visualizer is on. (The main switch must be on.) | |
| 0 | 154 | \$9A | Recall Preset | This command sends "?" back and waits for character input "1"- "9" for preset number. Then the Preset recalls. (max. 3 seconds time for the character input) | 10 |
| 0 | 155 | \$9B | Store Preset | This command sends "?" back and waits for character input "1"- "9" for preset number. Then the Preset stores. (max. 3 seconds time for the character input) | 10 |
| 0 | 213 | \$D5 | Preset 0 Factory-Preset | This command recalls the Factory-Preset. (approx. DIN A5, Light on) | 8, 9, 10, 11 |
| 0 | 202 | \$CA | Preset 1 | This command recalls Preset 1. | 10 |
| 0 | 203 | \$CB | Preset 2 | This command recalls Preset 2. | 10 |
| 0 | 253 | \$FD | Preset 3 | This command recalls Preset 3. | 10 |
| 0 | 216 | \$D8 | Save Preset 1 | This command stores the current Visualizer-settings as Preset 1. | 10 |
| 0 | 217 | \$D9 | Save Preset 2 | This command stores the current Visualizer-settings as Preset 2. | 10 |
| 0 | 254 | \$FE | Save Preset 3 | This command stores the current Visualizer-settings as Preset 3. | 10 |
| 0 | 229 | \$E5 | Preset Max. Wide | This command zooms to the maximum wide position, light is switched on. | 8, 9 |
| 0 | 230 | \$E6 | Preset DIN A4 | This command zooms to approx. DIN A4-size, light is switched on. | 8, 9, 11, 12 |
| 0 | 231 | \$E7 | Preset DIN A5 | This command zooms to approx. DIN A5-size, light is switched on. | 8, 9, 11, 12 |
| 0 | 232 | \$E8 | Preset DIN A6 | This command zooms to approx. DIN A6-size, light is switched on. | 8, 9, 11, 12 |
| 0 | 233 | \$E9 | Preset DIN A7 | This command zooms to approx. DIN A7-size, light is switched on. | 8, 9, 11, 12 |
| 0 | 234 | \$EA | Preset DIN A8 | This command zooms to approx. DIN A8-size, light is switched on. | 8, 9, 11, 12 |
| 0 | 235 | \$EB | Preset Max. Tele | This command zooms to the maximum tele position, light is switched on. | 8, 9 |

| Page | Dec. Code | Hex. Code | Command | Description | see Notes |
|------|-----------|-----------|------------------------|---|--------------|
| 0 | 236 | \$EC | Preset Slide | This command zooms to approx. slide-film size, light is switched off. | 8, 9, 11 |
| 0 | 237 | \$ED | Preset X-ray DINA4 | This command zooms to approx. DIN A4-size | 8, 9, 11, 12 |
| 0 | 238 | \$EE | Preset X-ray DIN A5 | This command zooms to approx. DIN A5-size. | 8, 9, 11, 12 |

Visualizer Menu, Camera control

| Page | Dec. Code | Hex. Code | Command | Description | see Notes |
|------|-----------|-----------|----------------------------------|---|-----------|
| 0 | 218 | \$DA | Unlock Visualizer-Menu | This command unlocks the Visualizer-menu. After sending this command the menu can be entered by sending 206. | |
| 0 | 206 | \$CE | Visualizer-Menu on/off | This command enters the Visualizer menu (can be unlocked with 218!) which is then displayed on the screen. If the Menu is locked, then send this code 1 sec. with 10 Hz (repetitively). By sending this command again, the menu disappears and is locked again. | |
| 0 | 139 | \$8B | Unlock Extra-Menu (Baud rate) | This command unlocks the Visualizer-extra-menu. After sending this command the menu can be entered by sending 206. | 14 |
| 0 | 208 | \$D0 | Function Up | Moves the menu-cursor up (if the menu is activated). | |
| 0 | 209 | \$D1 | Function Down | Moves the menu-cursor down (if the menu is activated). | |
| 0 | 210 | \$D2 | Data Right / White Balance | Changes the data of the current menu-item if the menu is activated. If the menu is not activated, a white-balance is performed. | |
| 0 | 151 | \$97 | White Balance | By sending this command the camera performs a white balance. (Also works, when the menu is on.) | |
| 0 | 211 | \$D3 | Data Left / Text Enhancer On/Off | Changes the data of the current menu-item if the menu is activated. If the menu is not activated, the Text Enhancer is toggled (switched on or off). | |
| 0 | 150 | \$96 | Text Enhancer On/Off | By sending this command the Visualizer switches the Text Enhancement on. If the Text Enhancement is already on, it is switched off. (Also works, when the menu is on.) | |
| 1 | 158 | \$9E | Text Enhancer On | This command switches the Text Enhancement mode On. | |
| 1 | 159 | \$9F | Text Enhancer Off | This command switches the Text Enhancement mode Off. | |
| 1 | 160 | \$A0 | Get Text Enhancer | This function returns '1'+LF +CR if the Text Enhancement mode is active and '0'+LF +CR if the Text Enhancement mode is inactive. | |
| 0 | 214 | \$D6 | Help | This command gives a description off the settings in the Visualizer-menu. | |
| 0 | 220 | \$DC | Data Left + Data Right | This command behaves like if you press Data Right and Left together, i.e. the menu-item is preset to the default value. | |
| 0 | 246 | \$F6 | Reset Menu | This command resets all Visualizer-settings except output-settings. | |

| Page | Dec. Code | Hex. Code | Command | Description | see Notes |
|------|-----------|-----------|------------------------|---|-----------|
| 0 | 241 | \$F1 | Custom Serial Mode On | This command switches the serial custom mode on. In this mode, the on-screen menu of the Visualizer can be controlled with the Data up/down and Data left/right commands. The current menu line (line marked with a cyan arrow in the on-screen menu) will be output via RS-232 (+ line feed + carriage return), i.e. > Color Settings <\$0A><\$0D>. Switching off the unit will deactivate the serial custom mode. | 13 |
| 0 | 242 | \$F2 | Custom Serial Mode Off | This command switches the serial custom mode off. | 13 |

Reply Mode Control

| Page | Dec. Code | Hex. Code | Command | Description | see Notes |
|------|-----------|-----------|-----------------|--|---------------|
| 0 | 156 | \$9C | Reply Mode Off | By sending this command the Visualizer changes to the "no reply mode". In this mode the unit does not send a reply when a command is received. This is the default mode after power on the unit (mains). | 15, 16 |
| 0 | 157 | \$9D | Reply One Byte | By sending this command the Visualizer changes to the "one byte-reply mode". In this mode a byte is replied after each command that is received via the serial interface. If a valid command was received, the byte \$06 is replied. If an invalid command was received \$0F is replied. The Visualizer replies also a command if you send only the page select command. | 15, 16, 17 |
| 0 | 158 | \$9E | Reply Two Bytes | By sending this command the Visualizer changes to the "two byte-reply mode". This mode is similar to one byte-reply mode except that the byte which was just received is repeated before the \$06 or \$0F. e.g. if the Visualizer receives \$C8 (i.e. Power On) it replies \$C8 \$06. If it receives \$10 (i.e. an invalid command) it replies \$10 \$0F. | 15, 16, 17 |
| 0 | 159 | \$9F | Reply String | By sending this command the Visualizer changes to the "string-reply mode". In this mode the Visualizer replies 'OKAY'+LF +CR if a valid command was received or 'ERROR'+LF +CR if an invalid command was received. | 3, 15, 16, 17 |

Miscellaneous Commands

| Page | Dec. Code | Hex. Code | Command | Description | see Notes |
|------|-----------|-----------|---|---|-----------|
| 0 | 032 | \$20 | Blank-Echo (' ') | This command (\$20 is the ASCII-value of a blank) echoes a blank (' ', without CR or LF) back to the controller. This may be useful for checking if the Visualizer is ready for receiving commands. | 3 |
| 0 | 118 | \$76 | Visualizer-Type and Software-Version output ('v') | This command returns the Visualizer-Type and the version no. of the built-in Software (EPROM-version) back to controller. The output-format is as follows: e.g.: 'VZ-C30 V1.12b'+LF +CR | 3, 18 |
| 0 | 250 | \$FA | Debug Mode on | This command switches the debug mode on. | |
| 0 | 063 | \$3F | Camera and optic status ('?') | This command works only if the debug mode is activated. This command returns the camera and zoom wheel status depending on the Visualizer model and installed firmware in following format (i.e. VZ-C30 with firmware v2.04a): 'LVDS locked. No LVDS-problems detected.' '+LF+CR 'CZ:0 CF:0 CI:0 LZ:0 LF:0 LensReady:1'+LF+CR 'Accu: U:4711mV I:7% t:411min'+LF+CR 'Lightvoltage (Low-Side): 0mV'+LF+CR 'S: 0 R:255 G:255 F:255 B:255 Low:254 AF:0 AE:1'+LF+CR 'Flip:0 Portrait:0'+LF+CR 'CCDExp:324/792 Iris:000 IrisTD:000 GainAll:0 GainR:99 GainG:43 GainF:43 GainB:127 IrisOpt:164'+LF+CR 'Wheel:159 -> 0 -> 0'+LF+CR 'Cam.Ambient-Temp:67 Cam.ADC-Temp:46'+LF+CR 'InView.Detail:3, MenuSet[0].Detail:3,cDetailNoise Level:6'+LF+CR 'MBType: FB3 Rev.0'+LF+CR | |
| 0 | 095 | \$5F | ASCII ('_') | This commands initiates direct ASCII-text input: After receiving '_', the Visualizer responds with a question-mark. After that you have to send the three-digit decimal-number of the wished command within three seconds. These three digits are echoed back by the Visualizer. This command will then be performed. (No CR or LF is needed.) This is useful for testing commands with a standard terminal-program. | |
| 0 | 175 | \$AF | Key Lock On | This command activates the Key Lock. When the Key Lock is active the Visualizer can only be controlled via RS-232 and not with the IR-remote-control or the keys on the unit. | |

| Page | Dec. Code | Hex. Code | Command | Description | see Notes |
|------|-----------|-----------|-----------------------------|---|-----------|
| 0 | 176 | \$B0 | Key Lock Off | This command deactivates the Key Lock. When the Key Lock is inactive the Visualizer can be normally operated with the keys on the unit, the IR-remote-control or via RS-232. | |
| 0 | 174 | \$AE | Get Key Lock | This function returns '1'+LF +CR if Key Lock is active and '0'+LF +CR if the Key Lock is inactive. | 3 |
| 0 | 160 | \$A0 | Get Status | This command returns all settings of the Visualizer depending on the Visualizer model and installed firmware in following format (i.e. VZ-C30 with firmware v2.04a): 'Zoom:FFF DigitalZoom:000 Focus:FFF Iris:FFF Power:0 AI:0 Light:0 LightBox:0 KeyLock:0 ImageTurn:0 ShowAll:0 Negative:0 Black/White:0 Text:0 ResolutionRGB:AUTO ResolutionDVI:VGA/60 Video: PAL Lamp1Blown:0 Lamp2Blown:0 OSD-Menu:0'+LF+CR (in one line) (The Values are for example only, '1' means that the respective item is on, '0' means that it is off. The zoom/iris/focus-positions are 3 digit HEX-numbers in the range from 000 to FFF.) In the future further items may be added. Therefore you should search for a specific item-string (e.g. 'Light:') within the complete string and then analyze the next character(s). | 2, 3 |
| 0 | 221 | \$DD | Switch IR-Mode | This command switches between IR-mode A, B, C and D (,A, B, ..). It's useful if you have up to four Visualizers close together with separate remote-controls. | |
| 0 | 244 | \$F4 | Demo-Mode | This command starts the demo-mode. In this mode the Visualizer demonstrates some of its functions, i.e. it continuously zooms, switches the image off and on, etc. . To exit the demo-mode, send any code or press any key. | |
| 1 | 128 | \$80 | Toggle Switch Intern/Extern | This command switches between the Visualizer image and the image from e.g. computer that is connected to the "Extern" connector. | |
| 1 | 129 | \$81 | Switch Extern signal On | This command switches the extern connected e.g. Computer image to the Visualizer output. | |
| 1 | 130 | \$82 | Switch Intern signal On | This command activates the output of the Visualizer image. | |
| 1 | 131 | \$83 | Get Extern | This function returns '1'+LF +CR if the Extern signal is active and '0'+LF +CR if the Extern signal is inactive. | |

Image Turn Commands

| Page | Dec. Code | Hex. Code | Command | Description | see Notes |
|------|-----------|-----------|------------------------|--|-----------|
| 1 | 132 | \$84 | Switch Portrait On/Off | This command toggles the Image turn mode (behaves same as the Image Turn key). (Portrait-/Landscape mode). | 19 |
| 1 | 133 | \$85 | Portrait On | This command activates the image turn mode On (+/-90° or 180°). | 19 |
| 1 | 134 | \$86 | Portrait Off | This command activates the image turn mode Off. | |
| 1 | 135 | \$87 | Get Portrait | When the image is turned by 0°, this command returns '0'+LF+CR, turned by -90° '1'+LF+CR, turned by 180° '2'+LF+CR and when it is turned by +90° this command returns '3'+LF+CR. | 20 |

Video Output Commands

| Page | Dec. Code | Hex. Code | Command | Description | see Notes |
|------|-----------|-----------|------------|--|-----------|
| 1 | 148 | \$94 | Video PAL | This command switches the Video output format to PAL. | |
| 1 | 149 | \$95 | Video NTSC | This command switches the Video output format to NTSC. | |
| 1 | 150 | \$96 | Get Video | This function returns 'PAL'+LF +CR if the PAL mode is active and 'NTSC'+LF +CR if the NTSC mode is active. | |

Output Resolution Commands

| Page | Dec. Code | Hex. Code | Command | Description | see Notes |
|------|-----------|-----------|---------------------|--|-----------|
| 1 | 144 | \$90 | Resolution UP | This command switches the Output resolution on both outputs up. | 21, 22 |
| 1 | 145 | \$91 | Resolution Down | This command switches the Output resolution on both outputs down. | 21, 22 |
| 1 | 146 | \$92 | Resolution XGA/75 | This command switches the Output resolution on both outputs to AUTO-detect. | |
| 1 | 147 | \$93 | Get Resolution VGA | This function returns the current resolution setting on VGA-output. E.g. "XGA at 75Hz" for XGA-standard at 75Hz refresh rate. | |
| 1 | 170 | \$AA | VGA Resolution UP | This command switches the Output resolution on VGA-output up. | 21, 22 |
| 1 | 171 | \$AB | VGA Resolution DOWN | This command switches the Output resolution on VGA-output down. | 21, 22 |
| 1 | 172 | \$AC | VGA Resolution AUTO | This command switches the Output resolution on VGA-output to Auto-detect. | |
| 1 | 169 | \$A9 | Get Resolution DVI | This function returns the current resolution setting on DVI-output. E.g. "XGA/75Hz" for XGA-standard at 75Hz refresh rate. | |
| 1 | 173 | \$AD | DVI Resolution UP | This command switches the Output resolution on DVI-output up. | 21, 22 |
| 1 | 174 | \$AE | DVI Resolution DOWN | This command switches the Output resolution on DVI-output down. | 21, 22 |
| 1 | 175 | \$AF | DVI Resolution AUTO | This command switches the Output resolution on DVI-output to Auto-detect. | |

Output Signal Setting Commands

| Page | Dec. Code | Hex. Code | Command | Description | see Notes |
|------|-----------|-----------|----------------------------|---|-----------|
| 1 | 151 | \$97 | Switch Positive On | This command switches to the positive image mode. | |
| 1 | 152 | \$98 | Switch Negative On | This command switches to the negative image mode. | |
| 1 | 153 | \$99 | Switch Negative Blue On | This command switches to negative blue image mode. | |
| 1 | 154 | \$9A | Get Positive/Negative | This function returns '0'+LF +CR if the Positive mode is active, '1'+LF +CR for the Negative mode and '2'+LF +CR for the Negative /Blue mode. | |
| 1 | 155 | \$9B | Switch Color On | This command switches the color image On. | |
| 1 | 156 | \$9C | Switch Black/White mode On | This command switches the image to a black/white image. | |
| 1 | 157 | \$9D | Get Black/White | This function returns '0'+LF +CR if the Color-mode is active and '1'+LF +CR if the Black/White mode is active. | |

Image Storing Commands

| Page | Dec. Code | Hex. Code | Command | Description | see Notes |
|------|-----------|-----------|-----------------|---|-----------|
| 1 | 140 | \$8C | Memory Store x | This command sends "?" back and wait for character input "1"- "9" for memory number. Then the Memory stores (max. 3 seconds time for the character input). | |
| 1 | 141 | \$8D | Memory Recall x | This command sends "?" back and wait for character input "1"- "9" for memory number. Then the Memory recalls (max. 3 seconds time for the character input). | |
| 1 | 142 | \$8E | Memory Off | This command switches to the Live image. | |
| 1 | 143 | \$8F | Snapshot | This command stores one memory after the other memory, until all 9 memories are stored. | |
| 1 | 136 | \$88 | Show All On/Off | This command toggles the Show All mode. (If this function is activated, the Visualizer is showing all stored images on the screen at the same time). | |
| 1 | 137 | \$89 | Show All On | This command switches the Show All Memories mode On. | |
| 1 | 138 | \$8A | Show All Off | This command switches the Show All Memories mode Off. | |
| 1 | 139 | \$8B | Get Show All | This function returns '1'+LF +CR if the Show All memories mode is active and '0'+LF +CR if the Show All memories mode is inactive. | |
| 1 | 165 | \$A5 | Erase Memory | This command erases all stored memories. | |
| 0 | 215 | \$D7 | Freeze On/Off | This command toggles the Freeze-Mode | |
| 1 | 166 | \$A6 | Freeze On | This command activates the Freeze function. | |
| 1 | 167 | \$A7 | Freeze Off | This command switches off the Freeze function | |
| 1 | 168 | \$A8 | Get Freeze | This function returns '1'+LF +CR if the Freeze function is active, and '0'+LF +CR if the life-image is active. | |

Image On/Off Control

| Page | Dec. Code | Hex. Code | Command | Description | see Notes |
|------|-----------|-----------|---------------------|---|-----------|
| 0 | 185 | \$B9 | Image toggle switch | By sending this command, the Visualizer toggles between image OFF and image ON. | 23 |
| 0 | 192 | \$C0 | Image on | By sending this command the Visualizer switches the image on. | 23 |
| 0 | 196 | \$C4 | Image off | By sending this command the Visualizer switches the image off. | 23 |

Notes

1. Zooming switches on Auto-Iris.
2. Not all zoom/focus/iris -positions in the range from 000 to FFF are supported („missing codes“). Reading the position always returns the exact position. Setting the position moves to the wished position as exact as possible.
3. Text under 'quotation marks' are ASCII-strings. The quotation marks must not be sent to the Visualizer and are not sent by the Visualizer. CR means Carriage Return (\$0D), LF is for Line Feed (\$0A).
4. Works with firmware v1.13a (or later) as one-push auto focus. With lower firmware version, the Visualizer focuses onto the working surface (pre-set) by sending this command.
5. The Auto Shutter, Auto Iris and dimming are not considered.
6. Changing the iris switches off the Auto Iris.
7. Lampchanger-commands available with firmware v1.30a and later.
8. These presets are pre-defined and cannot be modified. Focus is set to the working-plate, Auto Iris and image are switched on, and Text Enhancer is off.
9. The exact size of the picture depends very much on the adjustments of the monitor / video-projector.
10. Following Visualizer-settings are stored/recalled: Zoom-Position, Focus-Position, Auto Iris on/off, Iris-Position (if AI off), Image on/off, Light on/off, Text Enhancer on/off.
11. The image size depends on the distance between working surface and bottom of the Ceiling Visualizer. The "DIN size" is right with a distance of approximate 1.5m. If the distance is shorter, then the Ceiling Visualizer picks up a smaller image. If the distance is longer, a bigger image will be picked up.
12. DIN A8 = 52mm x 74mm [≈2" x 2.9"], DIN A7 = 74mm x 105 [≈2,9" x 4.1"], DIN A6 = 105mm x 148mm [≈4.1" x 5.8"], DIN A5 = 148mm x 210mm [≈5.8" x 8.3"] and DIN A4 = 210 x 297mm [≈8.3" x 11.7"]
13. Custom mode available with firmware v1.30a and later.
14. In this sub-menu it's possible to change the Baud rate of the Visualizer.
15. The verification if a command is valid or invalid is only done very roughly. E.g. if the Visualizer receives a zoom-command while the unit is in standby-mode, it recognizes a valid command and replies \$06 although the unit doesn't perform any action. Also the VZ-C11/C30 identifies a valid code for commands that are only supported on the VZ-57plus (and replies \$06 for a valid command), etc.
16. The reply mode is changed immediately after the respective command was received. This means that the new reply mode is already active for the command that changed the reply mode, i.e. after \$9C there is never a reply, after \$9F the Visualizer always sends 'OKAY'+LF +CR, etc.
17. The reply is always sent immediately after a command is received. When a command returns a status, this status is returned after the reply. E.g.: Reply mode = String Mode, Auto Iris = on: When the Visualizer receives \$A6 (i.e. Get Auto Iris) the unit replies 'OKAY'+LF +CR+'1'+LF +CR.
18. The current released version no. of today will be found on: <http://www.wolfvision.com/wolf/fware.html>.
19. Image rotation depends on the settings in the on-screen menu (miscellaneous settings): +90°, 180°, -90° or cycle.
20. Up to firmware version 2.03a, this command returns: '1'+LF+CR if the Portrait mode is active and '0'+LF+CR if the Portrait mode is inactive.

21. Since firmware v1.20a, some new resolutions are added:
- | | | |
|----------|----------------------------|--|
| VGA/60 | (640 x 480, 60Hz, 4:3) | Required for HDTV |
| XGA 16:9 | (1024 x 768, 60Hz, 16:9) | Special 16:9 resolution for older plasma monitor |
| WXGA/60 | (1366 x 768, 60Hz, 16:9) | Resolution for Widescreen monitor |
| WSXGA/60 | (1680 x 1050, 60Hz, 16:10) | Resolution for Widescreen monitor |
| 720p/50 | (1280 x 720, 50Hz, 16:9) | HDTV resolution (progressive scan) |
| 720p/60 | (1280 x 720, 60Hz, 16:9) | HDTV resolution (progressive scan) |
| 1080p/50 | (1920 x 1080, 50Hz, 16:9) | HDTV resolution (progressive scan) |
| 1080p/60 | (1920 x 1080, 60Hz, 16:9) | HDTV resolution (progressive scan) |
22. With firmware version v2.03a the SXGA+ resolution has changed from 1360x1024 pixels to 1400x1050 pixels for more display compatibility.
23. Image On/Off commands are implemented since firmware v1.12e.

Commands of other Visualizers, Future

The serial protocols of all WolfVision Visualizers are almost the same. Only some commands more or less are supported on other Visualizer-types due to the different technologies. (The VZ-7D has e.g. Auto Focus commands but no e.g. Sync-On-Green-command.) In the future (at higher FIRMWARE-versions) further commands may be added which are not supported yet.