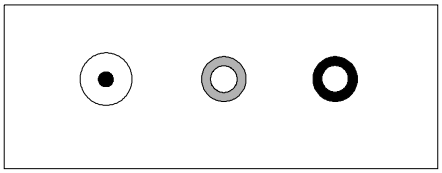
Serial Video Overlay Unit

The serial video overlay unit provides a simple platform for text over video applications. Each unit is provided programmed with the serial command interface program described in this document.

The serial video overlay unit is housed in a smart plastic enclosure with phono connectors for video in / out and a 2.1mm DC power socket. It is designed to be powered from the same 9 - 12V DC regulated power supply as the camera and so the unit does not have a power switch. A 1.2m serial cable with a female DB9 connector is supplied for connecting the 3.5mm socket on the left of the unit to a PC serial port. **Do not remove or replace the 3.5mm serial connector while the unit is powered.** Connect the serial line, video in and video out before powering the system up. The program should run immediately that power is applied to the board and the text display will appear after approximately 1 second. See overleaf for serial program operation.

Serial Video Overlay Unit



Front panel connectors

Power supply
It is recommended that a 9 - 12V DC regulated power supply is used. This must be connected via the 2.1mm power connector on the enclosure.

WARNING It is important to ensure correct connection of the video text overlay unit to the power supply or battery. Failure to observe correct power supply connection polarity may result in the electronic failure of the unit or in the battery bursting to cause personal injury and damage. The power supply must have a regulated output. Connection to a non-regulated power supply, in particular direct connection to the cigar lighter socket of a vehicle, can cause the unit to fail. **The warranty is void in such cases.**

Compatible with colour and mono composite video signals. 1Vp-p. PAL and NTSC
Dimensions: OSDSER 110 x 65 x 28mm
Power supply: 9 - 12V DC regulated
Power consumption: 50mA
Operating Temp: 0° - 85°C

WARRANTY

The BlackBoxCamera™ Company Ltd. warrants its products to be free of defects in materials and workmanship under normal use and service for a period of twelve months from the date of original purchase. The obligations of The BlackBoxCamera™ Company shall be limited within the warranty period, at its option, to repair or replace the product or any part thereof. The company shall not be responsible for dismantling and/or installation charges. To exercise the warranty the product must be returned carriage paid and insured. Under this limited warranty the maximum liability of The BlackBoxCamera™ Company shall not in any case exceed the purchase price of the product, which shall be fixed as liquidated damages and not as a penalty, and shall be the complete and exclusive remedy against The BlackBoxCamera™ Company. **This warranty does not apply in the following cases:** Improper installation, misuse, failure to follow installation and operating instructions, alteration, abuse, accident or tampering, and repair by anyone other than The BlackBoxCamera™ Company.

The BlackBoxCamera™ Company Limited, Rivington House, 82 Great Eastern Street, London, EC2A 3JF, UK.
Tel: 0844 504 7934 Fax: 0844 504 7935 EMAIL: sales@pic-osd.com www.pic-osd.com

Serial Command Interface Program

The serial command interface program allows simple control of the Serial Video Overlay Unit's video text overlay from a PC serial terminal program, custom software or other micro-controller. The video text overlay display is controlled by a series of commands described in this document and listed in summary at the end. In the description it is assumed that the unit is connected to a PC running Windows hyperterminal or another serial terminal program. The command format is the same if using custom software on a PC or micro-controller.

Without power the unit will store a string of up to 28 characters along with background, blink and invert attributes and screen position. When the unit is connected to power and video the video screen will display the text string at the screen position, and with the attributes, previously stored in the eeprom memory of the unit. The default settings of the unit are for the text to be displayed over the connected external video signal with non-inverted, unblinking text displayed without background. The unit will automatically detect the presence of the external video signal. With no external video signal the unit will automatically switch to generating its own internal grey scale video signal. The unit can also be set to default to its internal video signal regardless of whether a camera is connected. The unit will automatically detect the video standard, PAL or NTSC, at the time the unit is switched on. It will not detect a change in the video standard while the unit is powered, i.e. you cannot hot swap PAL and NTSC cameras. Disconnect the power, connect the new video input signal and connect the power again to select the new video standard. Although the character set can be changed the text size is fixed.

The default communication settings are 38400 baud, 8-N-1. 38400 baud is the unit's pre-set default baud rate. It can be set to 2400, 4800, 9600, 19200 or 38400 baud using the **Wnn↵** command, see the command set table. When the unit and the PC are connected typing return in the terminal program should be answered by the unit's command line prompt '>' being displayed in the terminal window. The serial command program has been tested with a PC serial port at normal typing speed. It has not been tested with any other serial equipment. All the serial program commands take variable times to execute. It is therefore important that any PC or microcontroller software application communicating with the unit uses receipt of the '>' character to indicate that a command has been completed before it sends the next command. A hyperterminal file with the correct communications settings, stv.ht, can be downloaded from our website.

The unit's commands consist of an upper case ASCII character(s), which identifies the command, followed by parameters, if any, and the return character ↵, hexadecimal 0x0D. The return character tells the unit that a command has been entered. When a command requires a numerical parameter, shown as nn in the command set table, this parameter is entered as two ASCII numeric characters in the range 00 to 99. So 1 is entered as 01. If you make a mistake entering a command then the backspace key can be used to delete characters back to the start of the line on the screen in hyperterminal. The character string display and storage commands **S** & **F** display strings up to 28 characters long. The T command puts the system into typewriter mode. In typewriter mode the characters are displayed on the screen as they are typed on the keyboard until a return is entered.

Command Usage Examples

The OSD is specified as being able to display 30 characters by 16 rows in PAL and 30 characters by 13 rows in NTSC. However on a normal CRT monitor you will only be able to display 26 characters by 14 rows in PAL or 26 characters by 11 rows in NTSC. On an LCD panel monitor which gives close to the full video frame you will be able to see approximately 28 characters by 15 rows in PAL or 26 characters by 12 rows in NTSC. To set the position at which text will written use the **Xnn↵** and **Ynn↵** commands, where nn is the desired character position 00 to 27 and line position 00 to 15 respectively. For example to display a string in the middle of the screen type **X05↵** then **Y05↵** followed by **SYour String Here↵** at the prompt. The string length used with the **S** and **F** commands is limited to 28 characters. If you type more than 28 characters the 29th will be interpreted as a return and the first 28 characters will be displayed, and stored. As you type you may use the backspace key to correct any errors you make. Your string will appear on the screen in the position you defined with the X and Y commands. A single line of text can be stored to provide a start up message. Initially the message "Go to www.pic-osd.com" will be displayed when the unit is powered. The initial position for the display of the stored string is character position 00 on row 00. To define the position which the stored string will appear use the **Cnn↵** and **Rnn↵** commands to set the character and row position. Type **FStored String Here↵**. The string is displayed and stored in the eeprom memory of the unit, with its position, and will be displayed whenever the system is powered up.

To clear the screen of text use the clear screen command, **A↵**. This command clears the visible text and leaves the stored string unchanged in the eeprom of the unit. Each text character displayed on screen has a background, blink and invert attribute which can be individually set to control how the character is displayed. To turn on the background attribute of subsequent text use the **ZH↵** command. To turn off the background attribute of subsequent text use the **ZI↵** command. The background attribute of text already written to the screen is not changed by these commands. The **B↵** command, which toggles the state of the background attribute is provided for backwards compatibility. When the background setting is off text will be displayed with solid characters with black outlines. When the background setting is on the text characters will be displayed on a solid grey background. The grey level of the background can be set to seven different levels with the **Hnn↵** command where nn is 00 to 07. For example type **H07↵** to set the lightest shade of grey. This command also sets the screen background grey scale used in internal video signal mode. The value set is stored in the unit. To turn on the blink attribute of subsequent text use the **ZJ↵** command. To turn it off use the **ZK↵** command. The **D↵** command toggles the blink attribute on or off. To turn on the invert attribute of subsequent text use the **ZL↵** command. To turn it off use the **ZM↵** command. The **I↵** command toggles the invert attribute on or off. The **Q↵** command turns all the character attributes off. The character attribute changes that you make will not be stored by the unit until you send the **O↵** command. This stores the current attribute settings. These settings will be used for the subsequent display of the string stored by the **FString↵** To display your stored string with the changed background, blink and invert attributes, type the stored string display command **E↵**. The string will be re-written to the screen. Regardless of the stored attributes used for the stored string the current character attributes of

any non permanent text are set to off each time the unit is powered up. If you display the stored string with the **E↵** command then the current character attributes will be set to the values stored. To set the current character attributes to the stored values without displaying the stored string use the **P↵** command.

The character white level brightness can be set to one of four levels using the **ZEnn↵** command. The nn parameter has the range 00 to 03. The brightest level is 00, the darkest is 03. The character black level is set with the **Gnn↵** command The nn parameter has the range 00 to 03. The darkest level (black) is 00, the lightest level (grey) is 03. These settings are stored in the unit as the changes are made. They affect all the displayed text immediately and the stored string when it is displayed.

To type directly to the screen first select the attributes desired for the text with the background, blink and invert commands. Then select the character and row start position for the text with the **X** and / or **Y** commands. Enter the **T↵** command. All the characters you type in the terminal window will now be displayed. To leave typewriter mode type ↵ again. The character position in typewriter mode is advanced automatically, but this does not affect the stored string position. Please note that typewriter mode should not be used to write to the screen from a PC or microcontroller application as the baud rate may exceed the rate at which characters can be displayed. Use the string display command.

The unit operates in two modes with regard to external video signal detection. In the default external video signal mode the unit will automatically detect whether an external video signal text is connected or not. If no external signal is detected then the unit will automatically generate it own internal video signal which provides a static grey screen background for the text display. When a video signal is connected the unit will automatically switch to the external video. In internal video signal mode the automatic switching is disabled and text will always be displayed over the internal video signal regardless of whether external video is connected. To switch to internal video signal mode type **N↵**. The grey level of the screen background is the same as the character background and is set with the **Hnn↵** command described above. To switch to external video signal mode type **M↵**. All program commands operate in the same way both video signal modes.

The text display can be moved relative to the screen origin with the **ZFnn↵** command and **ZGnn↵** commands. The **ZFnn↵** command shifts all the lines on the screen down by an offset of nn pixels where nn = 0..31. The default setting is 31 which puts the top line within the visible area of the screen for CRT monitors and ordinary televisions. This setting can be adjusted for LCD monitors which typically show more of the video frame. The **ZGnn↵** command allows the text display to be offset from the left of the screen by nn pixels where nn = 0..63. The default for this setting is 55 which again is the setting for a CRT or television. Adjust the screen position according to the type of display that you have.

To reset all values at the same time you may use the reset command, **U↵** which will restore all the system defaults.

The **ZA↵** command is reserved for use with the PC software used for setting the character set. It should not be sent from a serial terminal program.

Serial Interface Program Command Set	
Command	**Action**
A↵	Clears the entire screen. All character locations on the screen are filled with the space character
B↵	Toggles the character background display on and off.
Cnn↵	Sets the character position along the selected row (X axis) nn = 00..29. This value is stored in eeprom and sets the position of the stored string.
D↵	Toggles the character blink attribute on or off.
E↵	Displays the string stored in the unit at the character and row positions defined and stored in the unit by the C & R commands, with the attributes stored with the O command.
Fc0..c27↵	Stores the string entered in the eeprom memory of the unit. Up to 28 characters c0..c27 can be typed before entering a return character. The string is also displayed on the screen. The stored string is automatically displayed at start up and when the E command is entered.
Gnn↵	Sets the character outline black level. nn = 00..03, 00 = Darkest, 03 = Lightest. Default =00
Hnn↵	Sets the screen and character background black level. nn = 00..07, 00 = Darkest, 07 = Lightest. Default = 02
Inn↵	Toggles the character invert attribute on or off.
J↵	Not used
K↵	Not used
L↵	Moves character position to the next line, character position 00
M↵	Set the unit into external video signal mode
N↵	Set the unit into internal video signal mode
O↵	Store the current settings of the background, blink and invert character attributes. The stored settings are used for the display of the stored string.
P↵	Set the current values of the background, blink and invert character attributes to the stored settings
Q↵	Reset the current values of the character attributes to background = off, blink = off and invert = off
Rnn↵	Sets the character row position nn = 00..15 This value is stored in the unit
Sc0..c27↵	Displays a string of up to 28 characters. The characters typed are only displayed when return is entered
T↵text↵	Enters typewriter mode. Text characters entered are displayed immediately on the screen until a return character is entered to exit typewriter mode
U↵	Reset the unit to default values for character brightness, black level, screen background and X - Y display position
V↵	Not used
Wnn↵	Change baud rate. 00 = 2400, 01 = 4800, 02 = 9600, 03 = 19200, 04 = 38400
Xnn↵	Sets the character position along the selected row (X axis) nn = 00..27. This value not stored in the unit.
Ynn↵	Sets the character row position nn = 00..15.
Z	Not used
ZA↵	**RESERVED FOR CHARACTER SET REDEFINITION.** **DO NOT ISSUE THIS COMMAND VIA A TERMINAL PROGRAM**
ZB↵	Not used
ZC↵	Not used
ZD↵	Not used
ZEnn↵	Set the character brightness. nn = 00..03, 00 = Brightest, 03 = Darkest. Default = 01
ZFnn↵	Set the vertical display offset from the top of the screen. nn = 00..31. Default = 31
ZGnn↵	Set the horizontal display offset from the left of the screen. nn = 00..63. Default = 55
ZH↵	Turn the background attribute of subsequent text on
ZI↵	Turn the background attribute of subsequent text off
ZJ↵	Turn the blink attribute of subsequent text on
ZK↵	Turn the blink attribute of subsequent text off
ZL↵	Turn the invert attribute of subsequent text on
ZM↵	Turn the invert attribute of subsequent text off