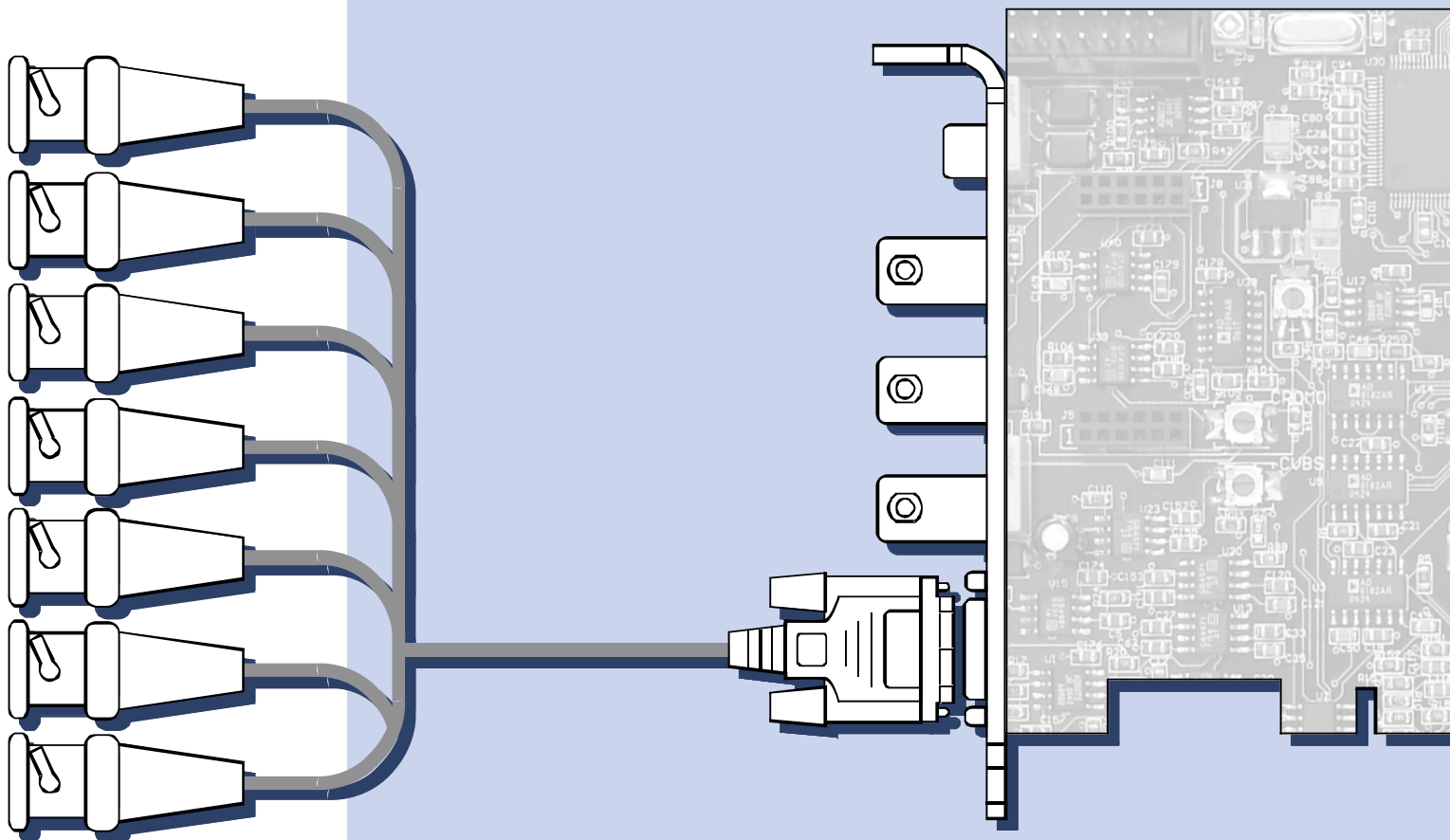# Stream Labs
TELEVISION COMPUTER SYSTEMS

Stream ALPHA Plus
Stream ALPHA Component
Stream ALPHA SDI
Stream WIND SDI
Computer graphics overlay cards

User's Manual

Windows XP™

Stream Labs QUALITY
3 YEARS WARRANTY

Warranty obligations

Stream Labs JSC provides the 3 year warranty for the Stream ALPHA and Wind SDI series cards. It includes the free-of-charge repair in case of defects made through our faults or faults of manufacturers of components. The manufacturer shall not be liable for the defects caused by the wrong operation of the device.

Copyright

Hardware and software components of Stream Alpha card sets may not be copied or transmitted in any form without prior consent of Stream Labs JSC.

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Professional TV character generation and automation is our specialty

The Stream ALPHA and WIND SDI series computer graphics overlay cards are intended for the real-time operation and ensure the titling, output of ads blocks and design of live TV programs, such as news, weather forecasts, live sports reports, talk shows etc. The system was developed as an open platform making it possible to use varied software. Structurally, the station comprises the IBM compatible PC equipped with PCI computer graphics overlay and titling card and software operating in Windows XP.

Such an approach provides the system with flexibility, growth potential and extended functionality due to the updated software and increased computing capacity. The open architecture allows to build the station according to specific application. The standard delivery set includes all interfaces and tools required to use the station as a character generator for program editing and on-air performance. As regards program composing, the only constraint is an artist's imagination: any fonts, 3D shadows, semitransparent masks, textures, complex multi-layer designs, animation and many other things are available. Besides, in contrast to character generators included into the non-linear editing equipment, the Stream ALPHA and WIND SDI based systems do not require the digital video disk processing with deteriorated quality due to the compression, disk space consumption and significant time costs required for caption processing.

Software developers attempted to meet all current customer needs. Now we are able to meet virtually any challenges, from crawls output to interactive programs creation, live polls and automated output of blocks of news and ads, etc.

Description of system components – hardware

Stream ALPHA Plus computer graphics overlay card

Stream Alpha Plus is designed to work with Composite or S-Video input and output signals of PAL, SECAM and NTSC standards. It also has a separate RGB (YUV) + Key Component output on the card to use computer graphics without mixing it with video. Stream Alpha Plus has the all-digital image formation chain, which improves the quality of generated signal and its binding to the input signal.

The card overlays graphics over live video signal using Alpha Channel that allows setting the transparency level of each pixel of the image and changing it when playing.

Stream Alpha Plus is equipped with internal sync generator that switches on automatically in case the input signal is missing. If computer power supply is switched off or BYPASS mode is activated, the output is directly connected to the input through relay contacts, and 75 Ohms load on the card is disconnected. The card can overlay computer graphics over video signal either internally or using the external mixer. It has a special KEY signal output to operate jointly with an external mixer. It is possible to switch on/off the internal multiplication of generated image by Alpha Channel.

In addition to the conventional analog mixing, the card can operate in the digital mode that enables decoding of the input video signal. The decoding and subsequent coding delays the video signal (about 10 µs). Digital mixing makes it possible to change standards of output signal relative to input signal (PAL↔SECAM, CVBS↔S-Video). Besides, it allows leveling down requirements to the quality of input signal, while keeping the high quality of output signal. Composite signal is decoded using "color combine filter" to separate brightness and chrominance signals.

In case of the digital mixing and SECAM output mode, the output flow is penetrated by "field color sync signals", which makes it possible to use the card for transcoding video standards PAL/SECAM and SECAM/PAL.

The possibility of capturing and hardware scaling of video signals from the card inputs allows changing the size of incoming video together with titling with minimal resources of central processor. Due to the usage of PCI-Express 1x bus on Stream Alpha Plus PCI-E, interface and card bandwidth enables overlaying full screen titles with alpha channel and capturing input video signal at the same time.

All the graphics generated by the card passes through the active digital filter. It is possible to enable/disable the insertion of the sync into the "Green" signal of the component output and Alpha Channel. Component RGB (YUV) output and Alpha Channel output make it possible to operate the card jointly with the mixer having an appropriate input and DSK input.

Specifications:

Dimensions	188x126 mm
Bus	PCI-Express 1x
Inputs (1.0V/75 Ohm)	Composite, S-Video: PAL, SECAM, NTSC
Outputs (1.0V/75 Ohm)	Composite, S-Video: PAL, SECAM, NTSC; RGB+DSK (YUV+DSK)
Analog mixing bandwidth	> 10 mHz
Differential nonlinearity	< 0,2%
Alpha channel	256 degrees of transparency
Alpha channel delay adjustment	From -127 to +127 ¼ pixel each
Chrominance subcarrier phase adjustment	from 0 to 360° (256 values)
Adjustment of graphics position relative to sync signal	Within the limits of entire active line with the pixel accuracy

Optional equipment

YUV option. Special connector unit for the output of YUV + KEY component signals (used when the card is connected to the mixer through DSK-input YCrCb + Alpha Key or RGB + Alpha Key) from D-SUB 15-pin card connector.

Preview expansion card. The installation of Preview expansion card on Stream Alpha Plus makes it possible to play back titles using Preview channel without any changes in the main mixing chain. The Preview output is connected to one of the card 15-pin connector output.

Audio BYPASS expansion card. The installation of Audio BYPASS expansion card on Stream Alpha Plus card provides the relay bypass of the audio channel.

Stream Alpha Component computer graphics card

Stream Alpha Component card is designed to process input/output YUV component signals. It uses 10-bit DAC with 4-x oversampling to generate clear and sharp image at the output. The card has the all-digital graphics generation channel and can function in both analog and digital mixing modes.

In case of digital mixing, the input signal is digitized, mixed with graphics and sent to the output with approx. 15 μs delay. In the digital mixing mode, the input signal may be a component YUV (RGB) signal, as well as an S-Video or Composite signal. In the latter case, the signal is decoded with the use of adaptive color combine filter for splitting brightness and chrominance signals.

The card overlays graphics over live video signal using the alpha channel, which makes it possible to adjust the transparency level of each image pixel.

Stream Alpha Component is equipped with an internal sync generator that switches on automatically in case the input signal is missing. If the computer power supply is switched off or BYPASS mode is activated, the output is directly connected to the input through relay contacts, and 75 ohm load on the card is switched off. The card may overlay computer graphics on video signal both inside itself and on the external mixer with proper YUV input and DSK (Down Stream Key input). For this purpose the card has a special KEY output for key signal and allows to switch off "multiplying" of the image generated by the computer to alpha channel.

There is also a separate sync input, Reference (also used as the composite input), and extra composite output.

Specifications:

Dimensions	172 x 107 mm
Bus	PCI, 32bit
Inputs	YUV (RGB) – 1.0V/75 Ohm; Reference – 0.3V/75 Ohm; Composite – 1.0V/75 Ohm
Outputs	YUV (RGB) – 1.0V/75 Ohm; KEY – 1.0V/75 Ohm; Preview – 1.0V/75 Ohm
TV standard	625/525 lines
Transmission band at analog mixing	> 10mHz
Alpha channel	256 degrees of transparency
Alpha channel delay adjustment	From 0 to ±127 ¼ pixel each
Chrominance subcarrier phase adjustment	From 0 to 360° (256 values)
Adjustment of graphics position relative to sync signal	Within the limits of entire active line with the pixel accuracy

Stream Alpha SDI computer graphics card

Stream Alpha SDI is a multifunctional video card, which is able to substitute several devices in a studio at the same time. In addition to the primary function of graphics overlaying on live digital SDI signal or output of graphics for external mixer, the video card is able to convert analog signals to digital SDI video signal (and vice versa) and may capture single shots (frames) and video fragments.

Stream Alpha SDI uses 8- and 10-bit serial component SDI input and 10-bit output signals, in compliance with CCIR656 and SMPTE259m recommendations. When signal passes through the card, all service information is preserved, and sound packages may be either kept or replaced, as required. In the input signal, error check with calculation of

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checksum is performed by EDH technique. At the output, EDH packages are always generated anew in compliance with SMPTE165 recommendation.

The card operates in the external synchronization mode using analogue reference. If computer graphics only is to be output, Black burst sync signal can be connected to the main or auxiliary analog input. If external reference is missing, the internal generator is used.

In order to use the above devices in combination with the external mixer having DSK input (Down Stream Key), key signal output (of alpha channel) in analog and digital format was specially designed. Card setup program allows to set both positive and negative delay of key signal relative to the output graphics within broad range.

If the computer power supply is switched off or BYPASS mode is activated, SDI input and output are connected together through relay, and 75-ohm load is switched off. There is no distortion in the pass-through signal at start up and during initialization.

For output of computer graphics the video card memory buffer with 720x576 pixels size for 50 Hz video systems and 720x480 pixels for 60 Hz systems is used. Each pixel has 32-bit representation, 24 bits of which are used for representation of its color (16 mln colors), and 8 bits – for specifying one of 256 transparency degrees (alpha channel). Although the computer graphics colors have 24-bit representation (8x8x8), at mixing 30-bit representation (10x10x10) is used, i.e. the input signal is a 10-bit one, it remains the same at the output after mixing.

The memory used for graphics buffer and PCI-bus bandwidth in modern computers enables real-time refreshing of its entire content without loss of shots, transmitting uncompressed image (32 bit/pixel) together with the sound.

In addition to the digital serial input, **Stream Alpha SDI** video card is also equipped with analog inputs – YUV/RGB, S-Video, and Composite. It also may generate analog signals YUV/RGB at the output simultaneously with SDI signal, regardless of the input being used.

For signals generation at the analog outputs 10-bit digital-to-analog converter with 4-fold oversampling is used. It allows obtaining HF noise total filtration without reducing the passband of Y channel output signals.

Stream Wind SDI computer graphics card

Stream Wind SDI card is designed to output computer graphics and embedded audio to the mixer or to the recording system. The card has the SD SDI input meeting the SMPTE259M recommendations.

The card operates in external synchronization mode using analogue reference. If external reference is missing, internal generator is used.

A special SDI key signal output (alpha channel) is provided to use above mentioned devices together with external mixer having DSK input (Down

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Stream Key). Card setup program allows setting positive or negative key signal delay regarding output graphics within wide range.

The buffer size of video card memory for computer graphics output is 720x480 – for 60 Hz. Each pixel has 32-bit resolution, where 24 bit is used for color (16 million gradations), and 8 bit to set up one of 256 transparency levels (alpha channel).

The memory used for graphics buffer and PCI-bus bandwidth in modern computers enables real time refreshing of its entire content without loss of frames, transmitting uncompressed image (32 bit/pixel) together with the embedded audio.

Specifications:

PCI bus	PCI 33/66 MHz
Inputs	reference analog input – 0.3V/75 Ohm
Outputs	Composite Preview – 1.0V/75 Ohm; SD SDI FILL (SMPTE259M standard); SD SDI KEY (SMPTE259M standard)
Resolution	720x576 (720x480 for 60 Hz systems), 32 bit; YUV+Key 4:4:4:4, RGB+Key 4:4:4:4 or 16 bit YUV 4:2:2.
Video buffer updating rate	90 Mb/s

Assignment of Stream ALPHA card connectors

Prior to installing and connecting Stream Alpha cards, please get familiar with the connector layout and assignment.

Stream ALPHA Plus

- **Composite In:** BNC connector. PAL, SECAM, NTSC signal input.

- **S-Video In:** miniDIN-4 connector. S-Video (Y/C) input.

- **Composite Out:** BNC connector. PAL, SECAM, NTSC signal output.

- **S-Video Out:** miniDIN-4 connector. S-Video (Y/C) video signal output.

- **YUV+Key/RGB+Key Out:** 15-pins D-SUB connector. Standard cable with 5 BNC connectors Y, Cr, Cb or R, G, B – red, green, blue accordingly, KEY – white, Preview output – black.
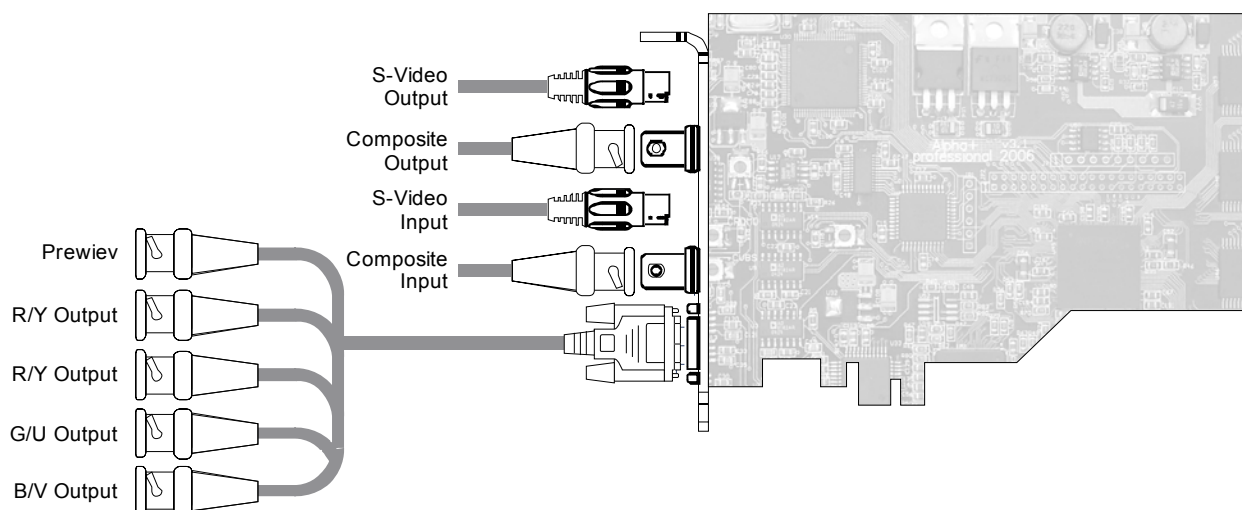
The connector cable is not included in the standard delivery set and can be purchased separately. The card default signal is RGB+Key; you can switch to YUV+Key mode by using the system settings (see below).

D-SUB 15-pins connector soldering pattern

1	2	3	4	5
R/Y	G/U	B/V	-	-
6	7	8	9	10
Ground	Ground	Ground	-	Ground
11	12	13	14	15
-	12V	Key	Preview	Relay

Analog and digital mixing modes

Any combination of connection types can be used when digital mixing mode is on. It also gives a free choice of standards at the input and output.

If the card is connected according to the PAL Composite – PAL Composite or PAL S-Video – PAL S-Video scheme without coding and subsequent decoding, the signal passes through the card without any changes and delay.

Analog mixing mode*

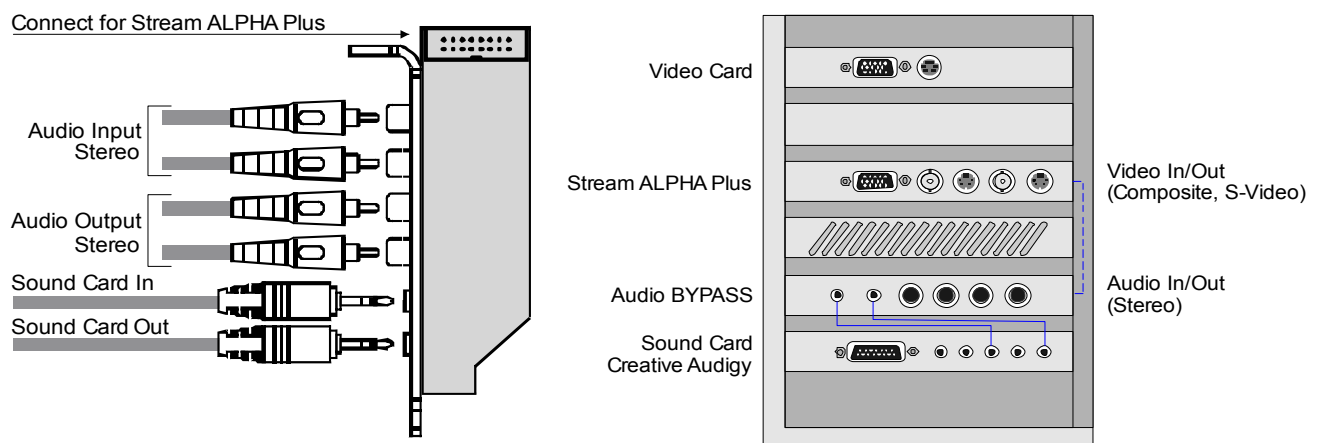| INPUT	OUTPUT
PAL Composite	PAL Composite RGB Fill + Key 50Hz YUV Fill + Key 50Hz
PAL S-Video	PAL S-Video RGB Fill + Key 50Hz YUV Fill + Key 50Hz
NTSC Composite	NTSC Composite RGB Fill + Key 60Hz YUV Fill + Key 60Hz
NTSC S-Video	NTSC S-Video RGB Fill + Key 60Hz YUV Fill + Key 50Hz

Digital mixing mode **

INPUT	OUTPUT
PAL/SECAM Composite or S-Video	PAL/SECAM Composite or PAL/SECAM S-Video RGB 50Hz YUV 50Hz RGB Fill + Key 50Hz YUV Fill + Key 50Hz
NTSC Composite or S-Video	NTSC Composite or NTSC S-Video RGB 60Hz YUV 60Hz RGB Fill + Key 60Hz YUV Fill + Key 60Hz

 * When analog mixing mode is used, only computer graphics in component format can be output from the D-SUB 15-pin connector.
** When digital mixing mode is used, both computer graphics in the component format and video signal can be output to the 15-pin connector.

## Audio BYPASS extension module for Stream ALPHA Plus card

- **Audio In:** RCA connector – Audio Line-In (Stereo)

- **Audio Out:** RCA connector – Audio Line-Out (Stereo)

- **Sound Card In:** Phonejack Stereo connected to Line-In of the sound card.

- **Sound Card Out:** Phonejack Stereo connector to Line-Out of the sound card.

Stream ALPHA Component

- **RCA connector:** Composite output (Preview signal).

- **37-pin connector** to connect special adapter having two bunches with four wires in each one. The first has reference input/Composite (black) and Y, Cr, Cb inputs (green, red and blue accordingly). The second bunch has Alpha Channel (white) and Y, Cr, Cb outputs (green, red and blue, accordingly).

  Attention! Whatever connection mode is used, it is necessary to connect sync signal to the card input (black connector) and Y (green connector).
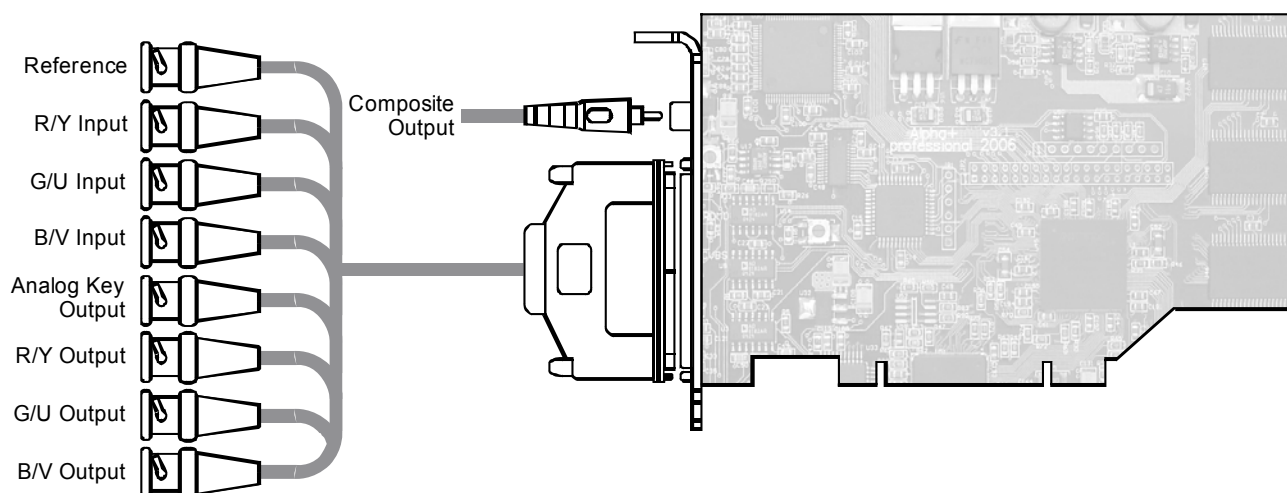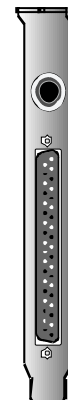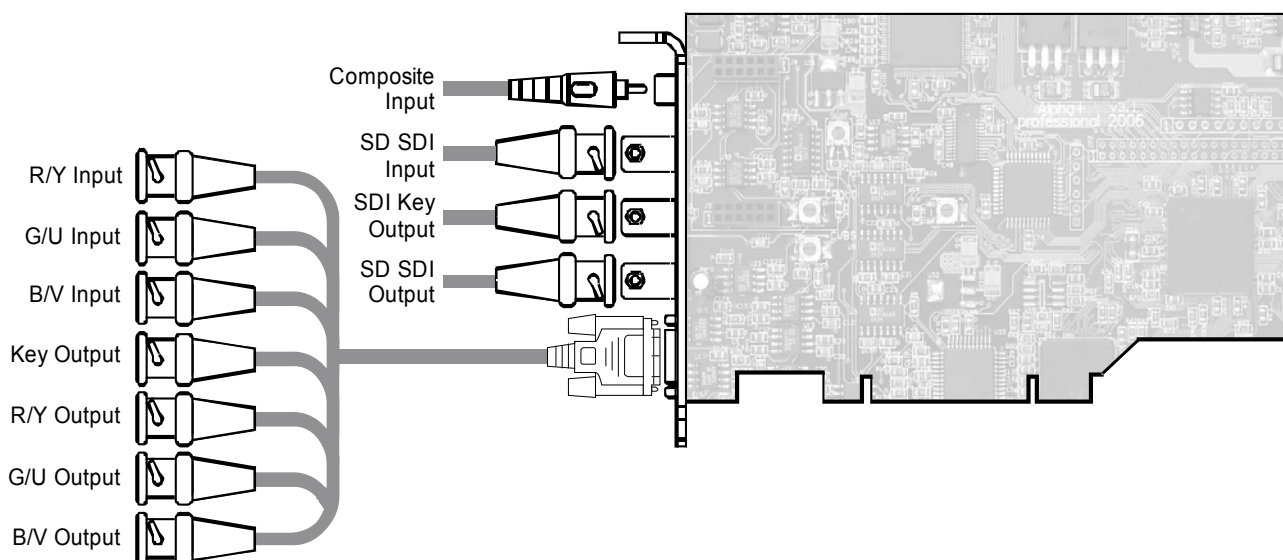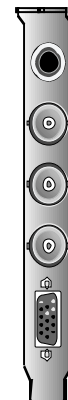

Scheme of D-SUB 37-pins connectors:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
-	-	Ref	-	V_1	-	U_1	-	Y_1	-	-	-	Key	-	V_2	-	U_2	-	Y_2

20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
-	G	-	G	-	G	-	G	-	-	-	G	-	G	-	G	-	G

REF – reference input/Composite; YUV_1 – inputs; YUV_2 – outputs; Key – Alpha channel output; G – ground.

Stream ALPHA SDI

- There are three BNC connectors on the card, one RCA connector and one 15-pins connector, which can be connected to the special adapter having seven BNC connectors – KEY signal output (white) and in 3 inputs-outputs Y/ Composite, Cr, Cb (green, red and blue accordingly).

- The card has SD-SDI inputs-outputs, YUV/Composite inputs-outputs and analog and SD output of DSK Alpha channel for connection with the mixer. When the card is connected to the mixer, reference can be send from both SDI and Analog input (Composite In).
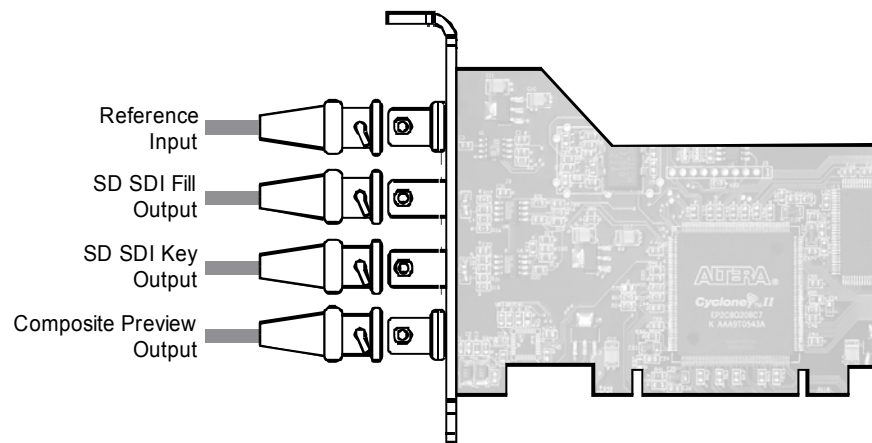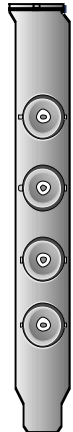

Scheme of D-SUB 15-pins connectors:

1	2	3	4	5
Cr Out	Y/Comp Out	Cb Out	-	-
6	7	8	9	10
Ground	Ground	Ground	-	Ground
11	12	13	14	15
Analog Key	Y In	Cb In	Cr In	-

Stream Wind SDI

- Analog reference input (Composite – Reference)

- SD SDI Fill output (SMPTE259M standard)

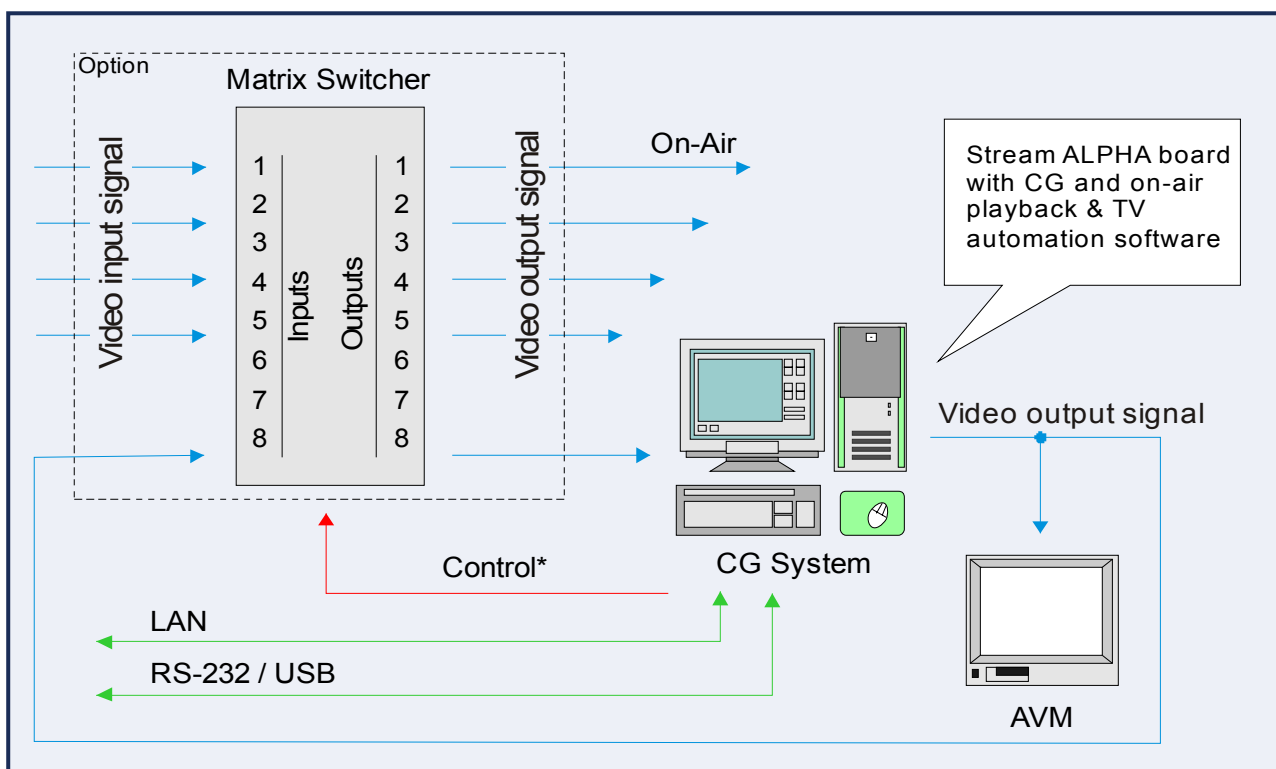- SDI Key output

- Analog output (Preview)

Reference
Input

SD SDI Fill
Output

SD SDI Key
Output

Composite Preview
Output

Connection diagrams of Stream Alpha cards

Connection of CG in the pass-through mode

If there is no possibility to connect CG (Character Generator) through the mixer, it can be connected in the pass-through mode. Titles and computer graphics overlaid over the video signal are delivered from the CG to the Stream ALPHA card input and the result of CG operation from the card output is sent on the air. It means that Stream Alpha card functions as a mixer.

The CG operation in that mode must comply with several requirements. Primarily, it concerns stability and reliability of the system. The reliability of the system based on PC depends not only on the reliability of titling card and appropriate software, but also on the other components of CG station. Therefore, to avoid "the black screen" during live broadcast all Stream ALPHA cards are equipped with by-pass relay. If the computer power supply is switched off or BYPASS mode is activated, the output is directly connected to the input through relay contacts and the live video signal passes through the CG without any changes. Stream ALPHA Plus and Stream ALPHA Plus YUV cards have also Preview output in order to preview the information prior to putting it on air.

*It is possible to control several external devices such as transcoder, mixer and switchboard.

Connection of CG through the mixer

For external mixer with DSK input (Down Stream Key), all Stream ALPHA cards have a special KEY output for the key signal produced by the card and the possibility to switch off the mixing of computer graphics (Fill) with pass-through or black burst signal inside the card via alpha channel. The program of card installation allows adjusting positive or negative delay of key signal relative to output graphics within wide range of values.
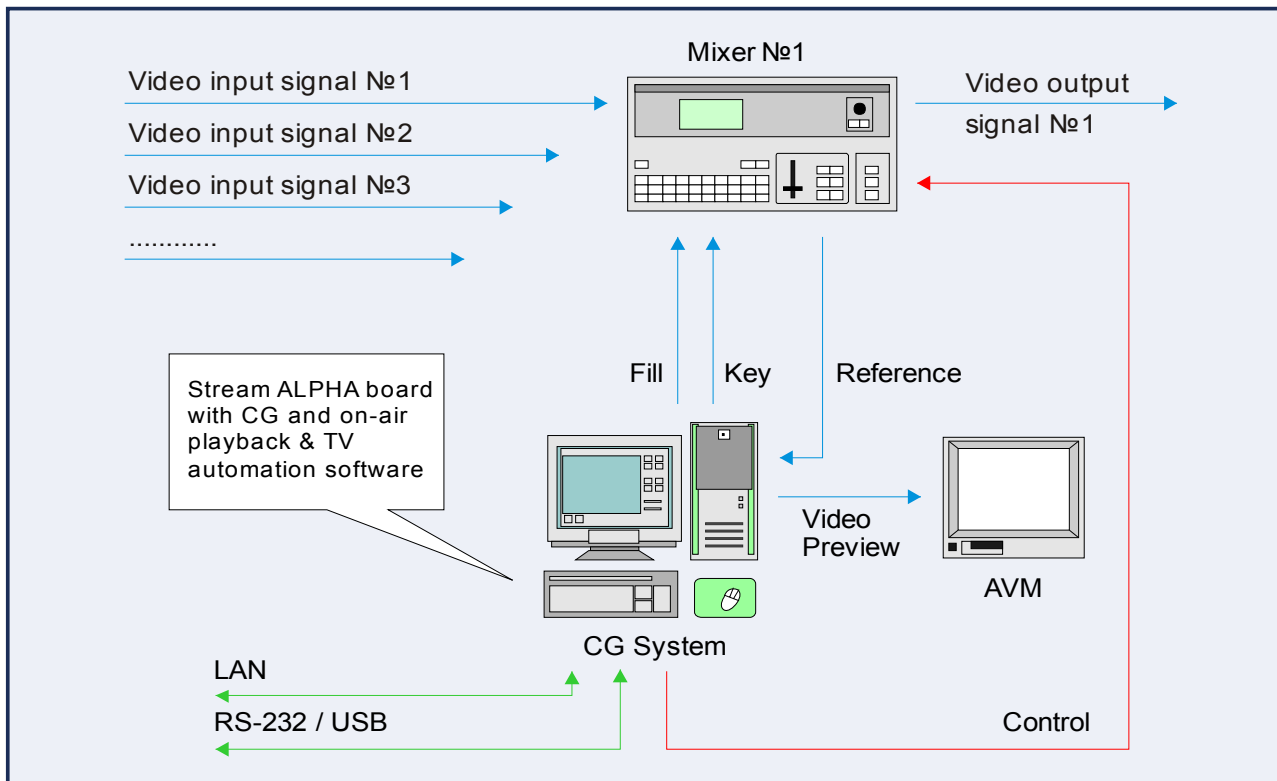
## Connection of CG to several channels through the mixer

Single CG as a part of regional TV studio serves several retransmitted channels one-by-one according to its own schedule. The retransmitted channels are almost always not synchronized, therefore it is necessary to use synchronizing mixer or switchboard. Then only one sync signal comes to the CG input (it may be lacking as well), and Fill and Key output signals come to DSK mixer. The control line from CG to the mixer allows controlling computer graphics output exactly at the moment according to the schedule.

When several character generators are connected through the network, the operator can control them remotely. Information output from several CG systems as well as on-line display of all the information coming to the computers can be controlled remotely via single program. Auxiliary devices can be connected to CG using COM and USB port.

Installation and connection of Stream ALPHA cards

1. Open the computer cover and install the card into the free slot. All Stream ALPHA cards, except for the new card Stream ALPHA Plus, should be installed into the standard PCI slot. The new Stream ALPHA Plus card uses the PCI-Express 1x bus. Care should be taken during the installation. The card should be handled with fingers at edges, which would make it possible to avoid touching the components of the card and damage them.

- It is recommended to avoid installing Stream Alpha card to the slot adjacent to the video card. Modern video adapters generally warm up. The overheated Stream Alpha cards can cause the deviation of some parameters of cards from the values specified by the manufacturer.

- If you install the card of Stream Alpha family to the case that is not provided with additional cooling, you are recommended to use the System Cooler for PC and install it into the adjacent slot.
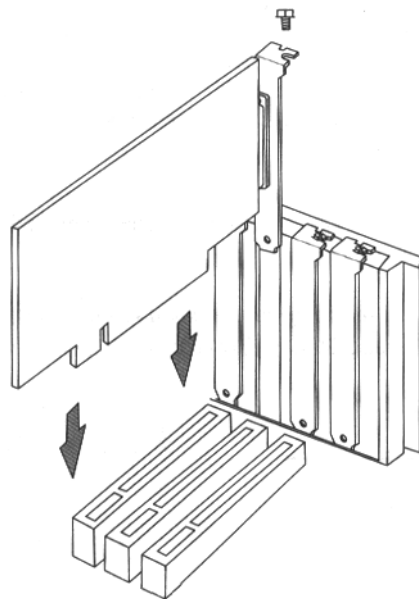
2. Close the computer.

3. Install the electronic protection key to the relevant connector of the computer.

4. Connect the video signal sources and receivers.

- **Stream Alpha Plus card**. If a video recorder is used as a video signal source, it should be provided with Time Base Corrector. If the consumer video recorder is used, the output signal quality is not guaranteed. If the duct is good for both S-Video and Composite signals, we recommend to use S-Video signals. This helps to significantly improve the image quality.

- **Stream Alpha Component card**. When using the Stream Alpha Component card, connect the sync signal (black) and YUV inputs (green, red and blue). In that case, you will get the overlay of Video + Graphics in YUV format (green, red and blue) and Composite signals at the card output.

If an external mixer is used, the sync signal should be connected to the card input (black input). In so doing, you will get at the output only Graphics in YUV format (green, red and blue) + DSK (Down Stream Key) and Composite Preview.

- **Stream Alpha SDI card**. In the pass-through mode, it is sufficient to connect the SDI input and output. Again, Video + Graphics and Composite signals shall be available at the card output.

When the external mixer is used, the sync signal should be sent to either SDI or Composite input. Which one is chosen is not of much importance. The card output provides Graphics SDI, Composite and DSK alpha channel output for connecting to mixer.

	WARNING! The computer and video equipment shall be energized by a single power mains. The computer must be grounded. If a separate grounded cable is available in your power mains, you should use it, otherwise the grounding cable may be laid out from the power switchboard (make the qualified personnel do this). The grounding quality will effect the safe condition of your equipment and image quality. To minimize the interference, it is recommended to connect the cases of computer and video equipment with one wire.

	WARNING! The connecting wires shall be not switched when the computer and video equipment are energized. This may lead to a failure of video system, computer and video equipment. Prior to switching, all equipment shall be cut off by disconnecting power cables!