Keying Option (+KEYER)

Manual Supplement

OPT-SW-F3GKEYER-MS (V1.3)

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Applicable for card firmware version: (or greater)	6748
Description of product/manual changes:	- Original instructions stated key and fill inputs needed to within a range of 0 to 200 samples earlier than program video for the fill to be inserted. If this was not done, a "Key Timing Error" message was displayed, and the key/fill would not be inserted into the video. Per an engineering change in later firmware versions, this advance is no longer required for insertion. However, it is recommended to slightly advance both key and fill timing such that both are basically equal in horizontal timing, and both are without resulting line offset indications (as displayed on the card **Key Status** and **Fill Status** displays). Shown below is an example of near-ideal practical indications.

Option ➡

Overview

This manual supplement provides descriptions and operating instruction for the **+KEYER** Option available as an option on new Cobalt® FUSION3G® (9900-Series) cards, and as a purchased field-installed licensable feature upload.

Note: If this option is to be field installed, your card must be compatible with supporting the +KEYER option. See below to make sure your card is equipped to support +KEYER option.

If your card displays **Processor Type B** or FPGA Version **.129**, it supports +KEYER.

If your card displays Processor Type A or FPGA Version .128, it **does not** support +KEYER. **This option cannot be used with this card type.**

Status	Product
Product	9901-UDX
Software Version	1.0.4662
Processor Type	B
FPGA Version	1.0.4600.129
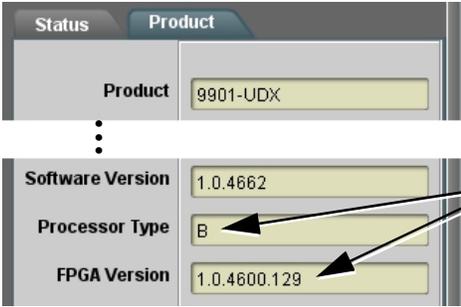
Processor Type B or **FPGA Version .129** displayed.

+KEYER Option Functional Description

(See Figure 1.) Option **+KEYER** provides for three of the card SDI video inputs to be used as respective program video, key, and fill inputs. Providing back-end (post scaler) keying, this function provides chroma keying using the **KEY VID IN** signal. The **FILL VID IN** signal provides the fill video that is inserted in the area "cleared out" by the key. The keying user interface displays key and fill timing relative to the card output video, allowing timing offset to be adjusted such that key and fill can be properly framed. (The option and its host card does not provide timing offset control of the key/fill video; offset must be provided by external frame sync cards or devices controlling the key and fill video feed.) The program video input when using keying accommodates either an SDI or an analog video input (when equipped with analog video in option); key and fill inputs are SDI only.

Alpha threshold keyer modes allow full-color key/fill from cost-effective generic sources such as a standard PC (with appropriate HDMI-to-SDI output conversion) hosting simple .bmp, .jpeg, or .png graphic files. In these modes, a common key/fill SDI input provides both the key and fill input.
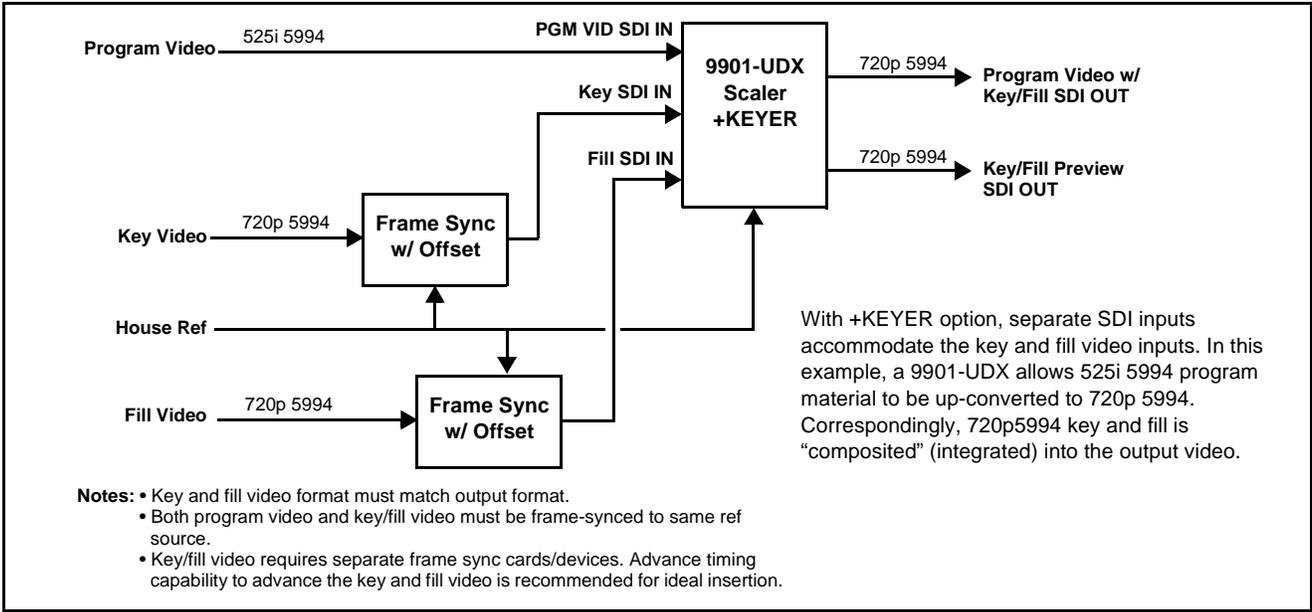
With +KEYER option, separate SDI inputs accommodate the key and fill video inputs. In this example, a 9901-UDX allows 525i 5994 program material to be up-converted to 720p 5994. Correspondingly, 720p5994 key and fill is "composited" (integrated) into the output video.

Notes: • Key and fill video format must match output format.
• Both program video and key/fill video must be frame-synced to same ref source.
• Key/fill video requires separate frame sync cards/devices. Advance timing capability to advance the key and fill video is recommended for ideal insertion.

Figure 1 Key/Fill Insertion on Up-converted SD-SDI

+KEYER Input Routing and Rear I/O Module Selection

(See Figure 2.) Because the **+KEYER** option requires two additional separate key and fill SDI inputs on the host card, a Rear Module having spare SDI inputs (which serve as the key and fill inputs for cards licensed for **+KEYER**) is required. Consult "Rear Modules" in card Product Manual for rear module assortment and descriptions.

RM20-9901-C and several other Rear Modules have **SDI IN A** thru **SDI IN D** ports. These inputs can be flexibly assigned as program, fill and key inputs (as shown in the example here). A Rear Module with this input complement is required for key/fill insertion.

Output connector assignment is flexible using the card **Output Video** cross-point routing tab. In this example, connector **SDI OUT A** is selected as the program video output, and **SDI OUT B** is selected as a key preview output.
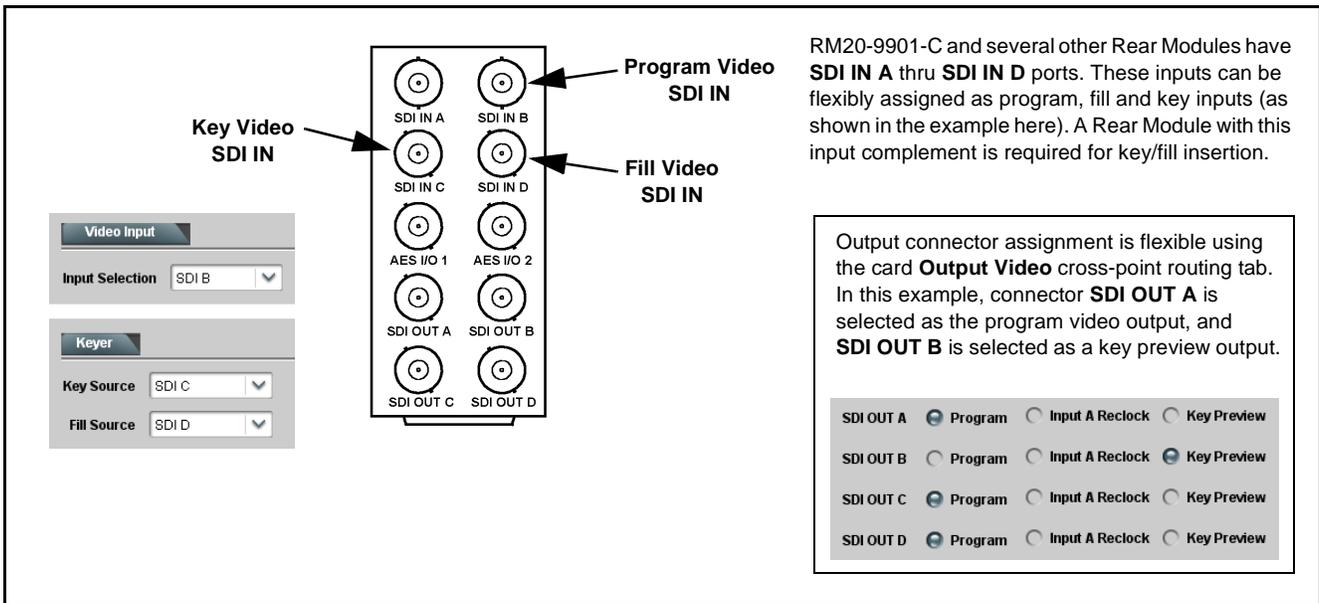
Figure 2 Typical Rear Module and Connections For Key/Fill Insertion

Uploading Option Feature (Field Upgrade Only)

**Note:** • **See important Note on page 1 regarding card compatibility before proceeding.**

• If your FUSION3G® card was purchased with the option(s) covered here, this procedure is not required for your card. If you have purchased this feature to be field-installed on an existing card, perform the upload procedure here to upload the feature key file sent by Cobalt, and to activate the feature on your card.

• To order features and obtain a license key, contact Cobalt® sales at sales@cobaltdigital.com or at the contact information on the cover of this supplement. Please provide the Serial Number of your card (displayed in the Card Info pane) when contacting us for your feature key. Typically, a feature is tied to the card's serial number and will only work with that card. Please indicate if upgrades are needed for more than one card.

Activate licensable feature as described below.

1. Cobalt typically supplies a .bin file (by e-mail; file size < 10kB) that activates the licensable feature. Download this file to a convenient location on the PC connected to the card's frame.

Note: During this procedure, the card will go offline while the feature is installed. Make certain card is not carrying OTA signal.

2. In DashBoard for the card being upgraded click the **Upload** button and browse to the feature license file (in the example below, license_cobalt_SN315909_9901-UDX.bin).
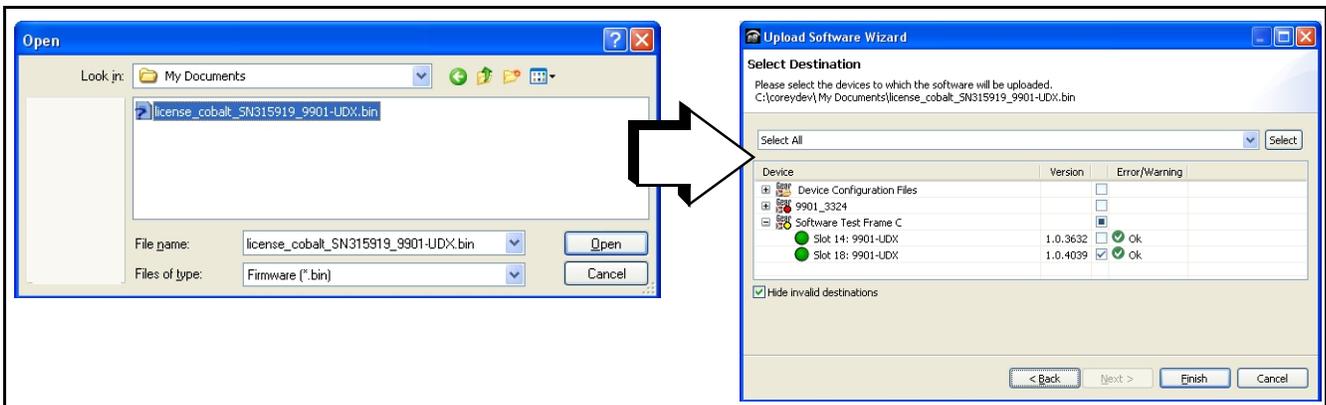
3. Select the file, click **Open** and then follow the prompts. With intended card selected ("Slot 18 UDX-9901" in example above), click **Finish**. When the card comes back online, the feature appears in the DashBoard controls and is ready for use.

Note: Applying the licensable feature has no effect on prior settings. All control settings and drop-down selections are retained.

Note: Added features, when first appearing after installation, are set to their factory default states. For features having a direct impact on the output signal, all controls are initially set to disabled or null.

Keyer Controls and Examples

Table 1 individually lists and describes typical Key and Fill controls available using DashBoard™ for FUSION3G® cards equipped with the **+KEYER** option.

- See Key/Fill Setup Example (Alpha Ramp with Separate Key/Fill Inputs), p. 6 for an example showing how to set discrete key and fill insertion timing and insertion width using DashBoard controls.

- See Key/Fill Setup Example (Alpha Threshold Using Combined Key/Fill Input), p. 7 for an example showing how to set combined key/fill insertion timing and properties using DashBoard controls.
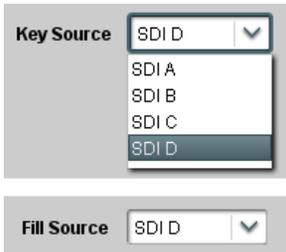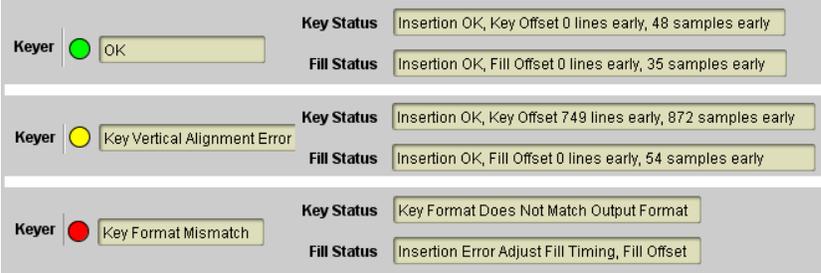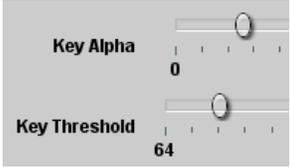
Table 1   +KEYER Option Control List and Descriptions

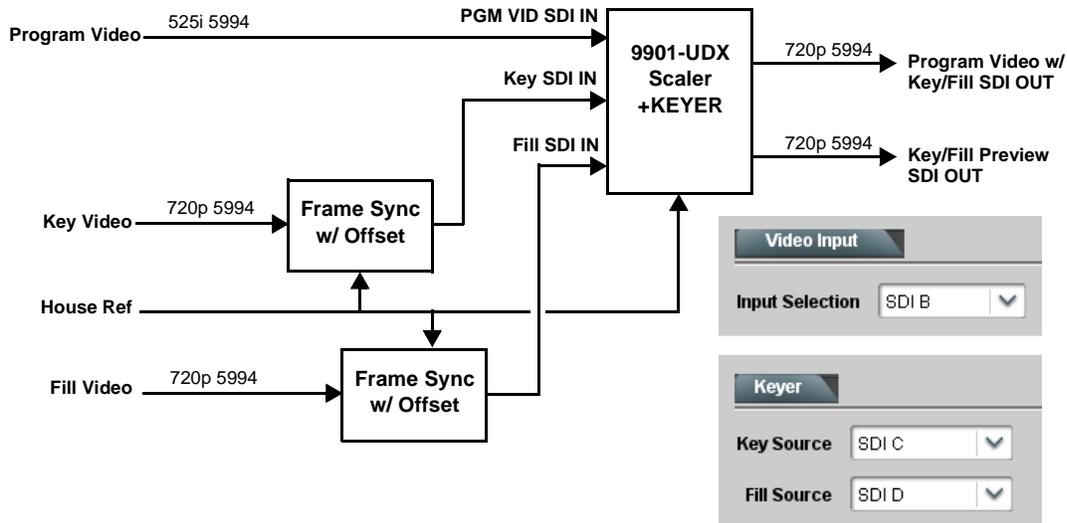| **Keyer**	Provides key/fill insertion controls and displays insertion status.
Option ⮕ **Key/fill** controls described below only appear on cards with + KEYER licensed optional feature. This feature requires a Rear Module that accommodates separate key/fill video inputs. Note that on cards also licensed with +WINGS, Wings and Keyer controls appear on the same tab.	
• **Key/Fill Source Controls** Key Source SDI D ▼ SDI A SDI B SDI C SDI D Fill Source SDI D ▼	Selects the card SDI input video ports to serve as the card's key and fill sources. **Note:** • Choices shown here are examples only. Card may not have full complement shown. • SDI inputs selected must be used on Rear I/O Module correspondingly equipped with intended input ports.
• **Key Mode Control** Key Mode Alpha Threshold ▼ Alpha Ramp Alpha Threshold Reverse Alpha Threshold	Selects key mode as follows: • **Alpha Ramp** setting is used when typical key/fill is provided by key/fill generator with separate key and fill outputs. See Key/Fill Setup Example (Alpha Ramp with Separate Key/Fill Inputs), p. 6 for more information. • **Alpha Threshold** or **Reverse Alpha Threshold** setting is used to provide keying using a combined key/fill signal derived from a simple graphic source. See Key/Fill Setup Example (Alpha Threshold Using Combined Key/Fill Input), p. 7 for more information.
• **Key/Fill Insertion Enable Control** Key Enable Enabled Apply Key To Program Enabled	**Key Enable** control sets up key/fill for insertion. When enabled, key preview is available on Key Preview output. When key preview shows desired results, **Apply Key To Program** can be enabled to apply the key/fill to the program video output.

Table 1   +KEYER Option Control List and Descriptions — continued

Keyer	(continued)
• **Key/Fill Status Displays**	Displays keyer timing status (on both Keyer tab and Card Status displays) as described below.

Note: • Key/fill timing is a function of the respective key and fill signal frame sync card/device(s). Ideal timing is within 0 to 200 samples early of output video timing. Key/fill timing cannot be controlled on +KEYER host card.

• Error in key/fill timing will result in loss of keying (however, program video image will not be corrupted).

Keyer	🟢	OK	**Key Status**	Insertion OK, Key Offset 0 lines early, 48 samples early	Key/fill insertion OK, within target 0-200 samples early
			Fill Status	Insertion OK, Fill Offset 0 lines early, 35 samples early	
Keyer	🟡	Key Vertical Alignment Error	**Key Status**	Insertion OK, Key Offset 749 lines early, 872 samples early	Key or fill insertion late error (in this example, late key video as shown by "wrap-around" line 749 lines early offset)
			Fill Status	Insertion OK, Fill Offset 0 lines early, 54 samples early	
Keyer	🔴	Key Format Mismatch	**Key Status**	Key Format Does Not Match Output Format	Key or fill video missing/mismatched format
			Fill Status	Insertion Error Adjust Fill Timing, Fill Offset	

• **Suppress Registration Warning Control** Suppress Key/Fill Registration Warning: **Enabled**	Enables or disables keying vertical alignment error message/status display, allowing nuisance error messages to be suppressed while performing setup.
• **Key Alpha/Threshold Controls** Key Alpha **0** Key Threshold **64**	When keying is set to Alpha Threshold or Reverse Alpha Threshold mode sets luma thresholds, when crossed, allow key/fill onto program video image. **Key Alpha** setting, when increased, increases the opacity of the key/fill. **Key Threshold** setting, when reduced, more readily allows the key/fill input to assert itself over more variations of program video luma levels. See Key/Fill Setup Example (Alpha Threshold Using Combined Key/Fill Input), p. 7 for examples using these controls.

Key/Fill Setup Example (Alpha Ramp with Separate Key/Fill Inputs)

Figure 3 shows an example of alpha ramp keying using separate 720p 5994 key and fill sources for program material set for a 720p 5994 format output. Note that the key and fill insertion timing is controlled by separate key and fill video framesync cards/devices.

The setup shown below is typical for support of key/fill using (in this example) a 9901-UDX scaler/framesync with the +KEYER option, and separate framesync cards to frame sync and provide timing offset for the key and fill video.

With the setup shown above running, key/fill is enabled with reference offset first set at default values. As shown, likely the **Key Status** will display late timing (shown as a "wrap-around" here as 749 lines early).

Noting that late key timing was initially indicated, small amounts of advance (early) key timing adjustments should be applied using, in this example, the key video framesync card/device.

Eventually when the offset is sufficient, the **Key Status** will display OK. Ideallly, offsets should display in the range of 0 to 200 samples, with both key and fill video timing near identical values.

Figure 3 Key/Fill Timing Setup Using Discrete Key and Fill Video (Alpha Ramp Mode)

Key/Fill Setup Example (Alpha Threshold Using Combined Key/Fill Input)

Figures 4 and 5 show an example of alpha threshold keying using a combined 720p 5994 key/fill source for program material set for a 720p 5994 format output. In this mode, both the **Key Source** and **Fill Source** are set to use the same SDI input. Note that the key/fill insertion timing is controlled by a separate key/fill video framesync card/device.
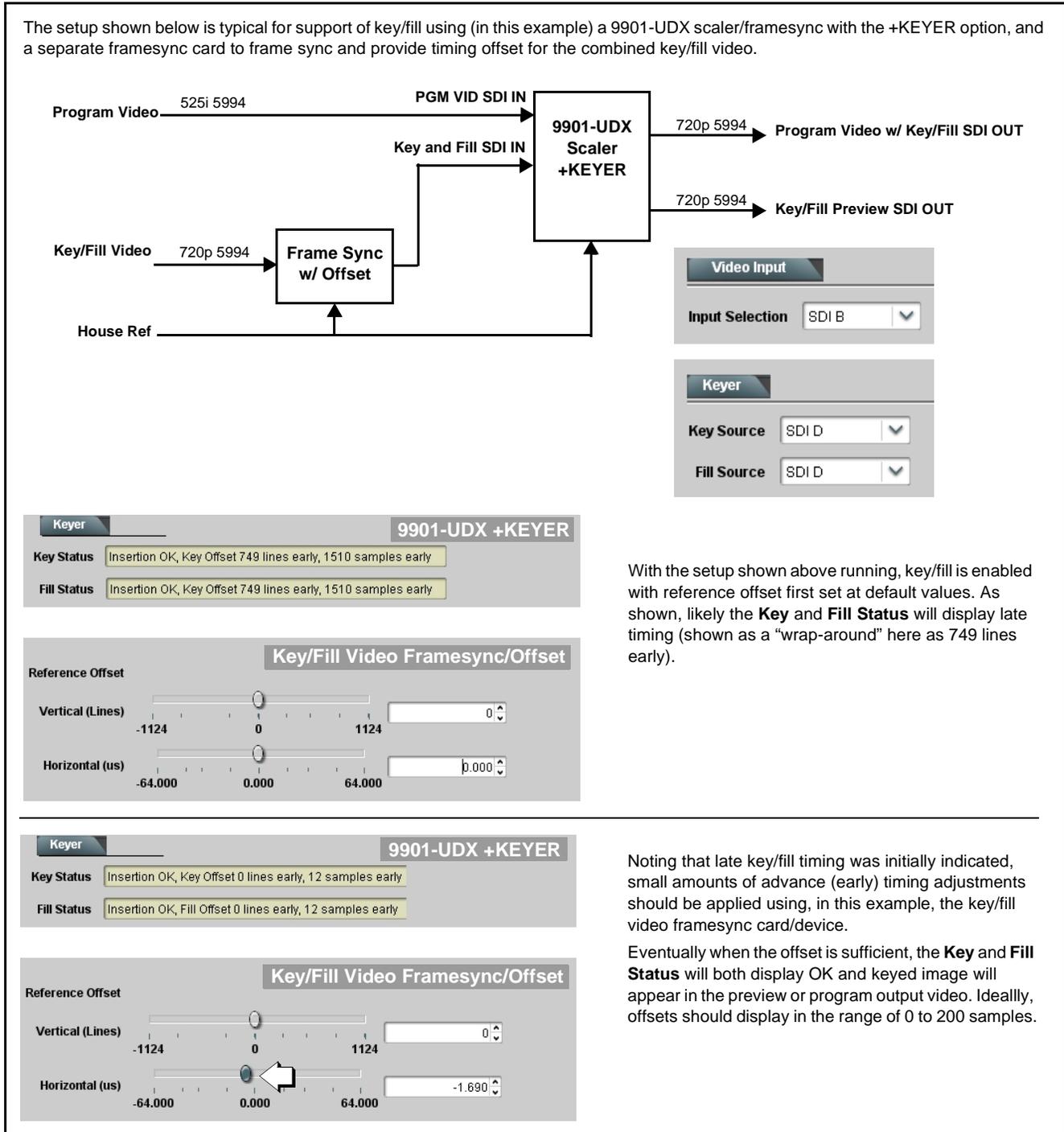

Figure 4 Key/Fill Timing Setup Using Combined Key/Fill Video (Alpha Ramp Mode)

Alpha Threshold keying allows cost-effective luminance keying from low-cost generic file-based graphic sources. With the graphic source applied to both the card **Key** and **Fill** inputs, the card **Key Alpha** and **Key Threshold** controls can be set to easily optimize the key/fill as shown below.

Key Threshold setting, when reduced, more readily allows the key/fill input to assert itself over more variations of program video luma levels. In the example to the right, progressively reducing the threshold setting allows more of the key/fill to assert iteslf over the prgram video.
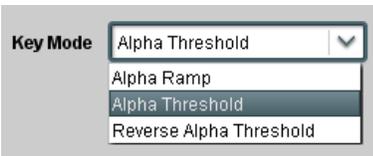
Key Alpha setting, when increased, increases the opacity of the key/fill. In the example to the right, progressively increasing the alpha setting increases the key/fill opacity.

When both settings are optimized, the key/fill appears consistent in opacity and free from edge distortions or graphic bleed lines appearing in the image.
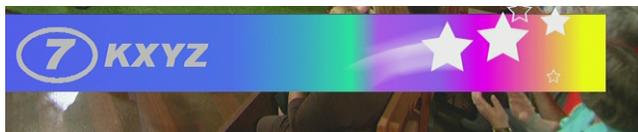
Alpha Threshold mode setting is suited for graphic sources using black backgrounds. **Reverse Alpha Threshold** mode setting is suited for graphic sources using white backgrounds.

When using either alpha threshold modes, set the **Key Source** and **Fill Source** to use the same source (in this example, SDI input D).

Figure 5 Alpha Threshold Keying Properties Controls and Examples

Hardware Setup For Using Alpha Threshold

Noting that the Alpha Threshold mode uses both the same signal for the key and fill inputs, low-cost computer-based graphic support for key/fill is available using the setup shown in Figure 6.
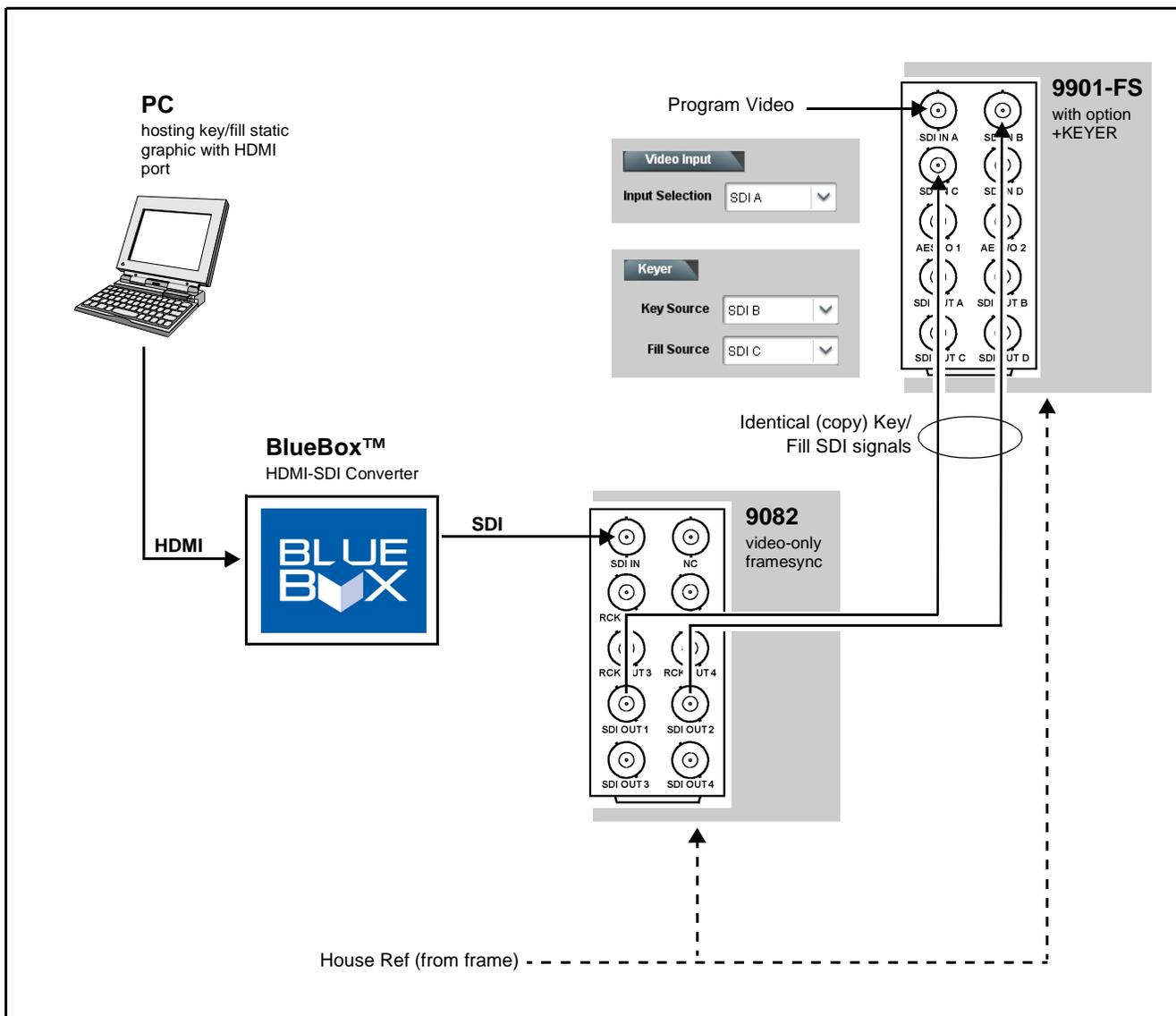

Figure 6 Low-Cost Alpha Threshold Example Hardware Setup