



SIERRA VIDEO

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SP-14 SETUP GUIDE

User's Manual



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Version S 1.0



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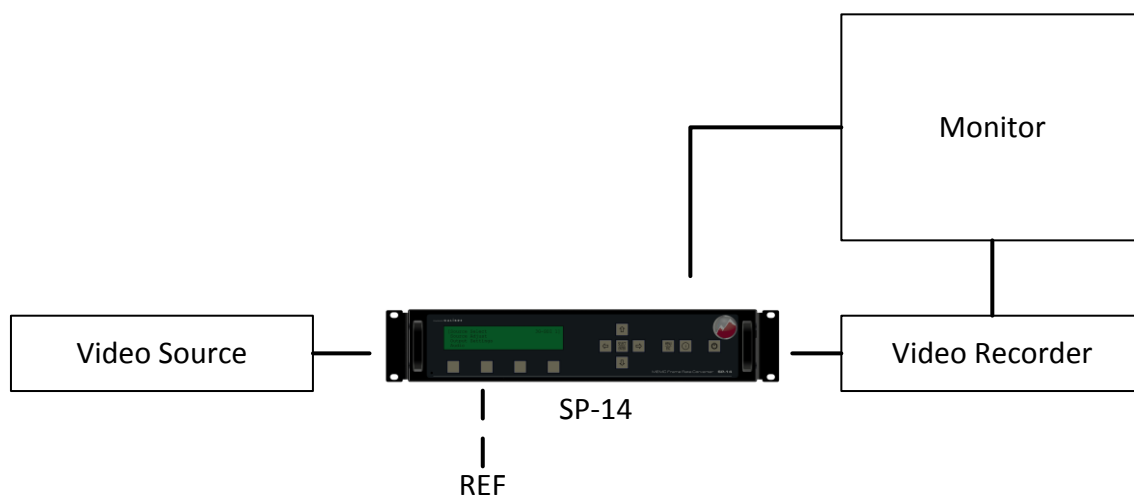


Introduction

This guide is a non-technical introduction to operating The SP-14 for up/down/cross standards conversion with MEMC motion compensation.

The guide describes how to setup, scale, adjust for the best pictures.

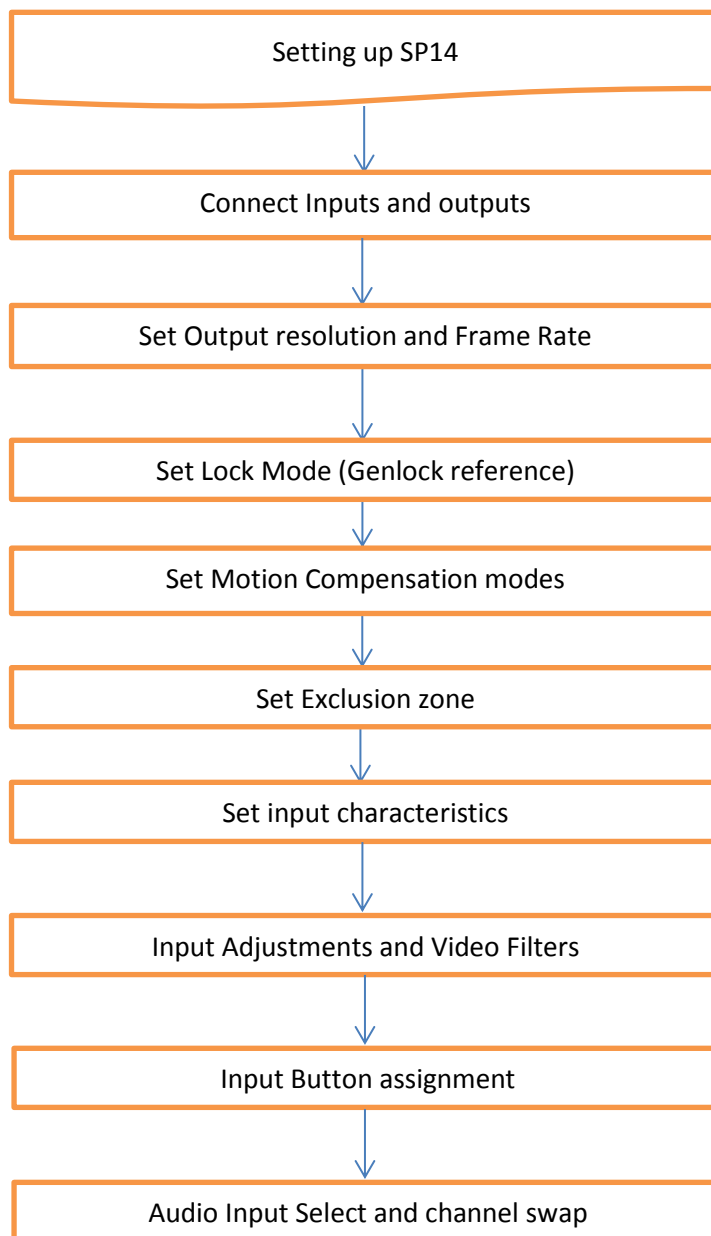
This guide does not replace the product user manual and covers only the essential functions to get started. For further information refer to the user manual.





The Basic Setup

The flowchart below represents the basic setup, additional information can be found further in this guide.





Flexible Connectivity

The SP-14 can be used as a routing switcher and universal interface for connecting many up-to-date and legacy formats

Inputs

2x 3G-SDI with automatic cable EQ, (HD-SDI & SD-SDI compatible) with embedded audio capability for 3G, HD & SD

1x HDMI with audio & deep colour, HDCP compatible

1x DVI-D, HDCP compatible

1x VGA Analogue graphics via 5 BNCs, supports RGBHV & RGsB

2x Composite Video via BNC (NTSC/PAL/SECAM)

1x S-Video via 2x BNC (NTSC/PAL/SECAM)

1x Component video YPbPr via BNCs

4x AES 48KHz digital audio pairs via BNCs

Outputs

1x 3G-SDI (HD-SDI/SD-SDI compatible) with embedded audio for 3G, HD & SD

1x DVI-D, HDCP compatible, HDMI deep colour capable, dual-function output automatically switches between DVI or HDMI depending on device connected to output

1x Component Analogue YPbPr

4x AES 48KHz digital audio pairs via BNCs

NB: For non-HDCP input signals all outputs can be used simultaneously but if the input signal is HDCP encrypted then only the DVI/HDMI output is available due to HDCP licensing rules.

SP-14 Rear Panel



Control via Front Panel LCD and Menu Buttons




The SP-14 has front panel LCD display which gives status information and access to the in-built menu system.

```
Sierra Video
SP-14
Software Ver:
```

Safe Operation

SP-14 features safe operating conditions

- 1) The front panel  Standby button must be pressed and held for 4 seconds to activate
- 2) The front panel channel select and menu buttons are locked by default; to activate the front panel press the menu button and then the input button

```
IN: 1920x1080i @50.00 Hz 3G-SDI 1
OUT:1920x1080i @59.94 Hz Free Run Mode
>>> Now press 'INPUT' key to unlock <<<
3G-SDI 1 C-YPbPr HDMI Test Pat
```

Attempting to operate menu when keypad is locked will prompt this message in the summary screen

```
IN: 1920x1080i @50.00 Hz 3G-SDI 1
OUT:1920x1080i @59.94 Hz Free Run Mode
Unlocked Keypad Preset 1
3G-SDI 1 C-YPbPr HDMI Test Pat
```

When the keypad is un-locked this message will show in the summary screen

This feature can be disabled in Menu>Miscellaneous>Unit Configuration

All menu items can be accessed via the front panel

- 1) Press 'Select/Enter' to access the menu
- 2) Use the 'up & down' keys to navigate the required menu item to the top of the screen
- 3) Press 'Select/Enter' to access that item
- 4) Repeat 2) and 3) to reach the item of choice
- 5) Use 'left and right' keys to select chosen mode
- 6) Press 'Menu/ESC' to back out of menu items



Setting Scaler Functions

Default Settings

The SP-14 comes with default setting that should give good results on most content but you do need to decide on some parameters for your application. As you get used to the unit you can be more adventurous

Input resolution and frame rate

The input resolution and frame rate is recognised automatically and displayed on top line of the status menu screen

```
IN: 1920x1080i @50.00 Hz   3G-SDI 1
OUT:1920x1080i @59.94 Hz Free Run Mode
Unlocked Keypad           Preset 1
3G-SDI 1   C-YPbPr   HDMI   Test Pat
```

In this example the input is 1920x1080P at 50Hz from the 3G-SDI input 1

Set Processor Output Resolution and Frame Rate

Set the processor output resolution and frame rate you require in the Output Settings menu Using the up and down arrow keys move Output Settings to the top of the window and press select

```
[Output Settings      ]↑
Audio
Closed Captioning
Information
```

Using the up and down arrow keys move Output Format to the top of the window and press select

```
[Output Format      1080i50]↑
Arc Mode           Side Panels/Ltrbox 25%
Arc Custom         N/A
Process Mode       Full Processing ↓
```

Press select, use the left and right arrow keys to choose the output format, press select

```
Output Format      >      1080i50<
Arc Mode
Arc Custom
Process Mode
```




Set Lock Mode

In this same section of menu set the reference mode for the output of the SP-14.

Using the up and down arrow keys move Output Settings to the top of the window and press select

```
[Output Settings      ]↑  
Audio  
Closed Captioning  
Information
```

Press select, use the left and right arrow keys to choose the Lock Mode, press select

```
[Lock Mode           Auto Format]  
Reference Source      Off  
Reference Offset  
Output Format         1080i50 ↓
```

Free Run mode uses the SP-14's in-built clocks to provide sync timing.

Note that if you choose Auto Format mode then the output resolution and frame rate will be determined by the external Genlock reference.

Note that if you choose Frame Synchronize mode the resolution is set in the 'Output Format' but the frame rate is synchronised to the Genlock signal when the genlock signal and frame rate of the mode set under Output Format are identical. This is for applications such as using a standard definition (SD) reference when outputting a high definition (HD) signal or vice versa.

If the genlock signal and the Output Format are both HD or SD then the output format and genlock signal format need to be identical to obtain a lock. Cross lock combinations that are not supported are reported in the menu status screen as not available (NA).

Genlock Reference

Item 2 on this section of menu 'Reference Source' enables the choice of either Bi/Tri Level Analogue reference or Digital SDI reference. Note these have separate input sockets on the back panel

Item 3 on this section of menu 'Reference Offset' enables full broadcast genlock timing adjustment



Set ARC Mode

If you are converting the Aspect Ratio of the picture there are pre-set modes to choose from or a custom mode, if you choose Custom Mode then you will also need to set the ARC Custom on the next line of the menu

Using the up and down arrow keys move Output Settings to the top of the window and press select

```
[Output Settings           ]↑  
Audio  
Closed Captioning  
Information
```

Using the up and down arrow keys move Arc Mode to the top of the window and press select

```
[Arc Mode           Side Panels/Ltrbox 25%]↑  
Arc Custom                               N/A  
Process Mode           Full Processing  
3G-SDI Data Map       10bit 4:2:2 YCbCr ↓
```

Press select, use the left and right arrow keys to choose the Arc Mode, press select

```
Arc Mode           > Panels/Ltrbox 25% <  
Arc Custom  
Process Mode  
3G-SDI Data Map
```



Set MEMC Mode

Background

Motion Estimation Motion Compensated (MEMC) Frame Rate Conversion (FRC) creates temporally correct motion in a sequence of pictures when the number of pictures per second is changed.

Basic Linear Frame Rate Converters either duplicate frames to increase the frame count or drop frames to reduce the frame count.

A variation to this idea is to use an 'aperture' setting which causes the stepping of either dropped or duplicated frames to be blurred.

Neither is desirable, MEMC processing solves this by synthesizing new intermediate frames. Below are two pictures of the same scene.

MEMC FRC will result in the appearance shown in the first picture. Moving parts of the picture such as the lady on the swing and the man pushing her remain crisp.



Picture 1 MEMC FRC conversion preserves the clear image of the moving parts of the picture



Linear FRC can result in the appearance shown in the second picture where the moving parts of the picture result in adjacent frames being merged together causing the appearance of blurring



Picture 2 Linear FRC conversion results in the moving parts of the image being blurred

The MEMC/FRC modes are pre-set to give good results on most content however, as with all motion compensation algorithms there are occasions when the video material characteristics require different settings. You will have to experiment with the settings to see what best suits your material.

Sports typically requires MEMC set to LOW, drama and documentaries may look better with MID or HIGH setting. The default setting is Medium.

```
[MEMC/FRC Settings          ]
Time Code Settings
Input Select                 3G-SDI 1
Input Adjust                 N/A ↓
```

Press select, to enter the MEMC/FRC menu

Press select, use the left and right arrow keys to choose the MEMC Mode, press select

```
[FRC Level                   MEMC medium]
MEMC Exclusion Zone
MEMC Demo Mode              Full Screen
Preserve Cadence            On ↓
```



FRC Level sets the amount of motion compensation difficulty tolerated before a frame is linearly converted. You may need to lower this level if your content is causing a disrupted picture. You can also turn off motion compensation if required.

MEMC Low concentrates on the background, so ensures that global motion, large area pans of the image, are handled correctly even if this means dropping back to linear conversion for smaller objects on the image. This works well where there is a lot of global motion and then many small moving items such as a soccer match.

MEMC High considers the motion of individual objects always, it will never decide everything is moving so pick up the whole frame and move it in its entirety as a single object. This works better for content with some pan but also with large moving objects whose clarity needs preserving.

MEMC Medium is able to change between the above two scenarios depending on content analysis.

MEMC Demo Mode allows the user to compare areas of the screen in processed and bypass modes on the one monitor. By default this is set to Full Screen for normal operation.



Adjustment of MEMC Cadence and Mask

Cadence Detection

```
[MEMC/FRC Settings ]
Time Code Settings
Input Select          3G-SDI 1
Input Adjust         N/A ↓
```

Press select, to enter the MEMC/FRC menu

Using the up and down arrow keys move Preserve Cadence to the top of the window and press select

```
[Preserve Cadence On] ↑
Cadence Detect 23-30Hz Non Accepted
Cadence Detect 50-60Hz 3:2, 2:2 only
Advanced .
```

Cadence detection settings are important to motion compensation algorithms because the processes required to deal with material that originated in film or film frame rates or has been down converted for internet use are different to the processes required to motion estimate normal video content originated with a video camera at 50 or 59.94 or 60 Frames Per Second.

Cadence correction is part of the de-interlacing process which, in order to apply the appropriate algorithm, must determine if the original movie was shot with a film or video camera.

Terms you may find associated with this process are "cadence detection," "film mode detection," "reverse telecine," "inverse telecine" and "reverse 3:2 pull-down."

Advanced correction algorithms can detect almost any repeating cadence which can be the result of splicing video and film clips together as well as careless editing in the studio.

SP-14 has default settings for the majority of content to help the MEMC process work efficiently particularly at scene cuts. You can choose different settings if your content requires this but scene cuts between content of different cadences may result in some linear conversion frames.

Preserve Cadence On/Off

Cadence Preserve adds a film cadence back into the frame rate converted output so that the underlying temporal information is at a lower frame rate. This preserves the film look of content shot with cadence. It is also able to track the need to preserve cadence or perform pure video conversion as scene cuts are detected. For example a soccer match itself will be shot as video, but sometimes the studio-based content such as pre and post-match interviews are shot with a cadence to give a sharper film-like look.

With Cadence Preserve on the film look will be maintained on scenes which were shot in this style. With Cadence Preserve off the output will always be smoother with a video-like feel.



MEMC Mask (exclusion area)

```
[MEMC/FRC Settings ]
Time Code Settings
Input Select          3G-SDI 1
Input Adjust         N/A ↓
```

Press select, to enter the MEMC/FRC menu

Using the up and down arrow keys move MEMC Exclusion Zone to the top of the window

```
[MEMC Exclusion Zone ]↑
MEMC Demo Mode      Full Screen
Preserve Cadence    On
Cadence Detect 23-30Hz Non Accepted ↓
```

Press select

```
[Enable MEMC Mask   Off ]
Display Border      Off
Left Edge           355
Right Edge          365 ↓
```

An area can be set to be excluded from the motion compensation process as its content may be impossible to accurately motion estimate.

For example:- This is useful for signals with 'Tika Tape' (scrolling text at the bottom of the screen), especially if the words or data have no background, and are moving across the bottom of the screen.

Such text portions of the content do not need Motion Compensation as they move too slowly to show staggered movement but it can 'up-set' the motion compensation algorithm, therefore SP-14 provides a tool to allow you to exclude from the MEMC process the area of screen that has this type of content whilst the rest of the screen is MEMC processed.

The numbers in the menu are a pixel count to help you position the area you wish to exclude or mask. The masked area border can be made visible for setting up, and hidden for normal use.

In the picture between the RED lines indicate where the MASK has been set to exclude the area where the crawling text and its background have been inserted into the picture



Input Settings

SP-14 has many features to help improve and re-master older material.

The default settings assume that your material is good quality.

If your material is noisy or untidy at the edges or lacks definition SP-14 can be used to improve the material in real time and at the same time as it standards converts.

The following are suggestions for correcting or improving content.

Input Adjust

```
[MEMC/FRC Settings      ]
Time Code Settings
Input Select             3G-SDI 1
Input Adjust             N/A ↓
```

Using the up and down arrow keys move Input Adjust to the top of the window

```
[Input Adjust           N/A ]↑
Output Settings
Audio
Closed Captioning      ↓
```

Each input of the Sierra Video processor has a dedicated memory. This allows the input characteristics to be set for each channel without affecting either any other input or the output calibration.

The menu system is contextual therefore some filters will say NA if they are not applicable to that input

In the main menu select Input Adjust

```
[Proc Amp               ]
Clock Position          N/A
Input Capture
Input Features         ↓
```




The first item in this menu is the **Proc Amp**.

This gives access to separate colour correction of R-Y and B-Y luminance and black level cut offs, Pal OIRE/ NTSC 7.5IRE Black level, Gamma, Hue and Saturation

The second item is for the **VGA graphics input timing** when scan converting from a computer. This is normally automatic but you can make manual adjustments if your signal requires this

The third item is Input Capture

```
[Overscan                0.0%]
Input Window Shift Horz  2048
Input Window Shift Vert   0
```

Input Capture allows you to **over-scan** the image and then move around inside the area, This is particularly useful when dealing with film transfers where the gate was visible or for video from the M2 format where YC timing errors caused cogging on the leading edge of lines.

The forth item is Input Features

```
[Sharpness                100]
Detail                    0
Unsharp Mask              0
```

Enables **Sharpness** and **Detail** settings to be adjusted to suit your material.

Real time **Unsharp Mask** processing can also be added to improve the image definition in older low resolution material. Especially suitable for material originally shot on film.

To get a flat frequency response through SP-14 to avoid exaggerating any edge problems inherent in the input signal, the settings to achieve this are:

Detail = 0, Sharpness = 100, Unsharp Mask = 0

The fifth item is Aspect Ratio

```
[AFD Mode                Forced]
AFD Default/Forced      Keep Last
AFD Source               N/A
Trim Width %            0.0 ↓
```

1/ Allows the user to select the processors response to the **AFD** (Active Format Description) information. This information can be missing or inaccurate causing automatic aspect ratio detection of the incoming signal to be intermittent. You can force the mode to be constant.

2/ The user can also trim the **width** and **height** of the picture and **pan** and **tilt** within the image. This is useful when changing from 4:3 to 16:9 ratios on material that was not shot with 16:9 safety area in mind.

The sixth item is Filters

These are available to help 'clean up' particularly analogue video signals.

Refer to the user manual section 4.8.6 for a full list of definitions



Input Select Buttons

```
[Miscellaneous ] ↑
```

```
[Select Test Pattern SMPTE Color Bars ]
Status Display Mode          General
Channel Logo Overlay
Input Channel Config         ↓
```

```
[3G-SDI 1 ]
3G-SDI 2
C-YPbPr
CVBS 1                       ↓
```

The four input select buttons can be allocated to which ever inputs you wish
Select Miscellaneous in the main menu, select the forth item **Input Channel Config**, press select
Choose the input channel of interest from the list, press select

```
[Input Select Key          None ]
Channel Reset
3G Level B Stream         Stream 1
```

Select the first item **Input Select Key**
Press select, use left and right arrow keys to assign an input key number and press enter
Exit the menu to see your section on the status screen



Choice of Audio Source

```
[Audio Input Select          Mute]
Input Pair 1 Mute          N/A
Input Pair 2 Mute          N/A
Input Pair 3 Mute          N/A ↓
```

In the Audio menu choose which Audio input(s) you wish to associate with your video input channel. Choose between Mute, 3G-SDI 1, 3G-SDI 2, digital AES channels, HDMI input or Test Tone.

```
[Output Pair 1 from      Input Pair 1] ↑
Output Pair 2 from      Input Pair 2
Output Pair 3 from      Input Pair 3
Output Pair 4 from      Input Pair 4 ↓
```

Further down in this section is Audio Channel Swap

This allows pairs of audio channels to be swapped around, particularly useful for putting local language on the primary audio channels

```
[Audio Delay Offset (ms)    ] ↑
HDMI Audio Input           N/A
```

Further down in this section is Audio Delay Offset

The audio is automatically delayed by the video processing time. This allows the audio delay to be changed to correct poor lip sync errors in the source material or to adjust for additional delays in other parts of the system

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