SIERRA VIDEO

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SP-14

User´s Manual

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Version S-1.0

This user manual complies with firmware revision 1-8-5a_build 10020. Prior or later firmware revisions may deviate in details or lacking of newly introduced features

SIERRA VIDEO

This manual explains how to operate your television broadcast image processor. The product is designed to provide users with a powerful and flexible method of format conversion.

If you have any queries relating to this or any other product supplied by Sierra Video please visit our web site www.sierravideo.com.

For technical support please e-mail info@sierravideo.com

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SAFETY WARNING:

1. THERE ARE NO USER SERVICEABLE PARTS WITHIN THE UNIT. REMOVAL OF THE TOP COVER WILL EXPOSE DANGEROUS VOLTAGES. DO NOT OPERATE THE UNIT WITHOUT THE TOP COVER INSTALLED.

2. ENSURE THAT ALL ELECTRICAL CONNECTIONS (INCLUDING THE MAINS PLUG AND ANY EXTENSION LEADS) ARE PROPERLY MADE AND COMPLY WITH ELECTRICAL SAFETY REGULATIONS.

3. ENSURE THAT THE INTEGRITY OF THE EQUIPMENT ISOLATION BARRIER IS MAINTAINED WHEN CONNECTING TO OTHER EQUIPMENT. THIS MEANS THAT ONLY LOW VOLTAGE ISOLATED CIRCUITS MAY BE CONNECTED TO THE SIGNAL SOURCES AND OUTPUTS. IF ANY DOUBT EXISTS CONSULT QUALIFIED SERVICE PERSONNEL.

4. TO PREVENT SHOCK OR FIRE HAZARD DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE. IF SUCH EXPOSURE OCCURS, REMOVE THE PLUG FROM THE MAINS OUTLET AND HAVE THE EXPOSED UNIT CHECKED BY QUALIFIED SERVICE PERSONNEL.

5. DO NOT CONTINUE TO OPERATE THE EQUIPMENT IF YOU HAVE ANY DOUBT ABOUT IT WORKING NORMALLY, OR IF IT IS DAMAGED IN ANY WAY. WITHDRAW THE MAINS PLUG FROM THE MAINS OUTLET AND CONSULT QUALIFIED SERVICE PERSONNEL.

6. DO NOT REMOVE ANY FIXED COVERS UNLESS YOU ARE QUALIFIED TO DO SO AND EVEN THEN WITHDRAW THE MAINS PLUG FROM THE MAINS OUTLET BEFORE YOU START.

7. THIS EQUIPMENT CONTAINS NO USER SERVICEABLE PARTS. REFER ALL SERVICING AND MAINTENANCE TO QUALIFIED SERVICE PERSONNEL.

8. TO AVOID EXPLOSION, DO NOT OPERATE THIS EQUIPMENT IN AN EXPLOSIVE ATMOSPHERE

SIERRA VIDEO

INTRODUCTION

1.1. General Introduction

SP-14 is a very flexible television broadcast image processor developed to convert between video formats and between PC and video formats.

SP-14 features a state of the art digital image processor with powerful scaling using a 1024-tap filter and market leading HD & SD per-pixel multiple low-angle aperture-adjusted motion-adaptive de-interlacing with automatic film pull-down correction for 3:2, 2:2 and non-standard and broken cadences, significantly outperforming the capabilities of benchmark competitor products.

SP-14 feature HQV post-production studio-grade image processing algorithms for the very best scaling, film and video noise reduction, MPEG artefact reduction and automatic audio time-line correction to maintain lip-sync.

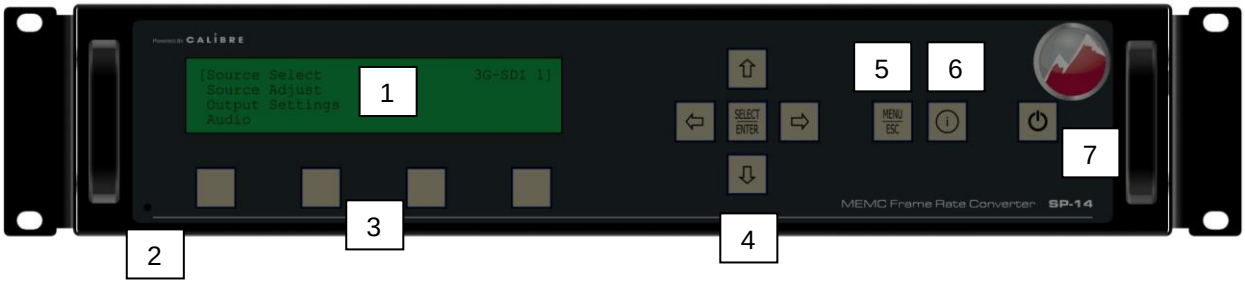
SP-14 features motion compensated conversion between modes with different frame rate providing smooth stutter free images (for example, when changing video content from the 50Hz to 60Hz domain)

SP-14 is a flexible video and audio router with multiple digital and analogue source channels, digital audio support and SDI/HD-SDI/3G-SDI compatibility.

The image may be zoomed and panned to select a particular area of interest. Scaling and aspect ratio treatment is extremely flexible.

1.1.1. Front Panel Control

System control is via a front-panel LCD menu controlled via keys or through a web interface via TCP/IP.



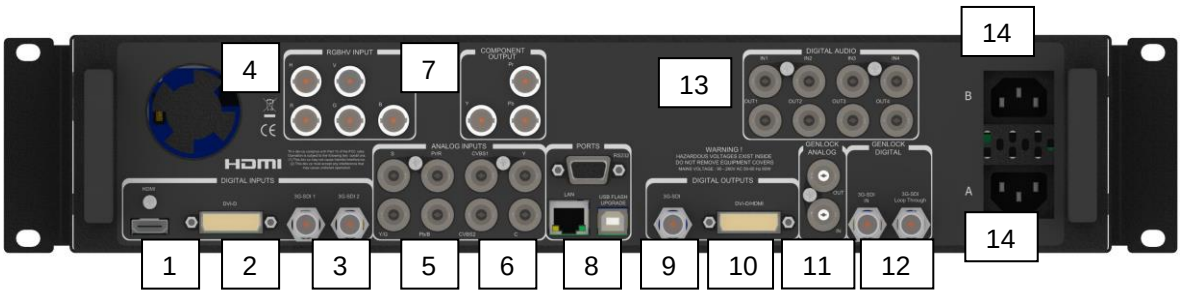
1: Menu display 2: Bore (Reset knob access) 3: (Programmable) source channel select keys
4: Menu navigation keys 5: Menu key 6: Toggle source channels 7: Standby

1.1.2. Rear Panel conectivity

SP-14 uses a very high performance video source front end including true component video support in analogue YPbPr and RGBS formats and SDI/HD-SDI/3G-SDI digital formats as well as dual composite (CVBS) and a Y/C S-Video source. A very high performance video decoder is utilised with 4x oversampling and 3D Y/C cross talk filter for outstanding video image clarity. HDMI and DVI video with HDCP encryption is supported as well as analogue RGBHV graphics source.

The output format can be set to a great number of different standard video modes from NTSC to 1080P modes performing time base correction or the output can be genlocked to the incoming video signal.

Outputs are available in analogue component, DVI digital and 3G-SDI formats which are useable simultaneously. Note that if an HDCP encrypted signal is connected to the HDMI or DVI source, the DVI output signal will be similarly HDCP encrypted and the other outputs will be disabled.



1: HDMI source 2: DVI-D source 3: 2x 3G-SDI sources 4: RBGHV source
5: YPbPr/RGBS source 6: Y/C and 2x CVBS sources 7: YPbPr output
8: Control Ports (RS232, TCP/IP and USB) 9: 3G-SDI output 10: DVI/HDMI output
11: Analogue Genlock source and output 12: SDI Genlock source and output
13: 4x/4x AES audio sources (top)/ outputs (bottom) 14: Dual redundant power supply

1.2. Packing List

SP-14 is supplied with the following

1) This manual
2) 3 pin plug IEC mains cable
3) DVI-D output cable

SYSTEM DESCRIPTION

2.1. Product Overview

SP-14 is designed to accept the following source signals:

2x Composite video via BNC
S-Video Y/C via 2x BNC
YPbPr or RGBS SD/ED/HD
component video via 3 or 4x BNC
VGA source via 5x BNC connectors (RGBHV)
2x 3G-SDI or HD-SDI or SDI
(Serial Digital Interface) via BNC
DVI-D (Digital Visual Interface)
via a DVI-I connector
HDMI via HDMI connector

2.2. Product Specification

This section provides technical details for all possible sources. Please note that not all possible source options may be applicable to certain output modes.

2.2.1. Power Supply Requirement

SP-14 have two internal power supplies. The unit can be set up to work from a single power supply or as a fail safe mechanism switch between the power supplies in case of one failing. Each mains source is rated 100V-264VAC 50/60Hz with maximum power of 60W connected via a standard IEC connectors located on the rear panel. The power source socket contains a fuse which should only be replaced with the same type and rating for continued product safety. The correct type and rating of fuse is stated on a label on the side or rear of the equipment.

2.2.2. Composite and Y/C Video Sources

Composite via BNC connectors, S-Video Y/C via 2x BNC connectors

Signal formats	Composite (CVBS), S-Video (Y/C),
	StandardsNTSC, PAL, SECAM
Composite (CVBS) source level	1V p-p nominal inc. sync
Luminance (Y) source level	1V p-p nominal inc. sync
Chrominance (C) source level	0.6V p-p nominal
Source Impedance (all sources)	75 Ohms

2.2.3. Component Video Sources

Via 3 or 4 BNC connectors

YPbPr, YPbPrS, RGB and RGBS component video, menu selectable.

Signal formats 484i (480i) and 576i (SD), 480p, 576p (ED), 720p, 1080i at 50, 59.94 and 60Hz and 1080p at 24, 25, 29.97 and 30Hz.

Please note this source does not support Computer SVGA signals.

2.2.4. SDI Source

Format:	SD-SDI HD-SDI YCbCr 4:2:2 serial digital component video 3G-SDI 4:2:2 and 4:4:4 serial digital component video
Source impedance:	75 ohms.

SMPTE 292M, SMPTE 259M-C and SMPTE 424M compliant, accepts 484i, 576i, 720, 1080i and 1080p single link formats at 270Mb, 1.485Gb or 2.97Gb rates. Level A and B transport is supported for 1080p 50, 59.94 and 60 Hz (2.97Gb rates).

2.2.5. Analogue VGA Source

Via 5 BNC connectors

Signal formats:

640x480, 720x400, 800x600, 1024x600, 1024x768, 1280x720, 1280x768, 1280x1024, 1360x768, 1400x1050, 1440x900, 1680x1050, 1920x1080

Please note this source does not support video type signals.

2.2.6. HDMI & DVI Sources

HDMI 1.3 with or without HDCP, 30-bit video compatible.

DVI-D source with or without HDCP

Video signal formats

484i and 576i (SD) in double-rate formats (1440 pixels per line), 480p, 576p (ED), 720p, 1080i at 50, 59.94 & 60Hz, 1080p at 24, 25, 30, 50, 59.94 & 60Hz.

Graphic signal formats

640x480, 800x600, 852x480, 853x480, 1024x600, 1024x768, 1280x720, 1280x768, 1280x800, 1280x960 1280x1024, 1360x768, 1365x768, 1366x768, 1368x768, 1400x788, 1440x900, 1600x900, 1366x1024, 1400x1050, 1680x1050, 1600x1200, 1920x1080, 1920x1200

2.2.7. Audio Sources

Embedded audio on SDI and HDMI
AES coaxial digital audio (4x)

2.2.8. Audio Output

Embedded audio on SDI and HDMI
AES coaxial digital audio (4x)

2.2.9. Display Output

Three output channels are provided, 3G-SDI via BNC, DVI-D via a DVI-I connector and Component Video Output via three BNC, which are useable simultaneously, provided the source signal is not HDCP encrypted.

Please note that this unit is HDCP compliant. This means that when the source signal has HDCP encryption, the DVI-D output connector will carry a similarly HDCP encrypted signal and the 3G-SDI and Component Video Output connector are disabled when output resolution is higher than 480i/576i. ***When an HDCP encrypted signal is source, but the display device does not support HDCP, the output image will turn black and the front panel displays a "HDCP Authorization FAILED" message.***

The DVI-D connector will support HDMI 1.3 with 30/36-bit video when connected to a suitable HDMI 1.3 receiver.

The Component Output is limited to 1080i50/60 and 1080p30/60 (and lower frequency) output modes. YCbCr 4:2:2 and YCbCr 4:4:4 data mapping is supported.

2.3. Genlock

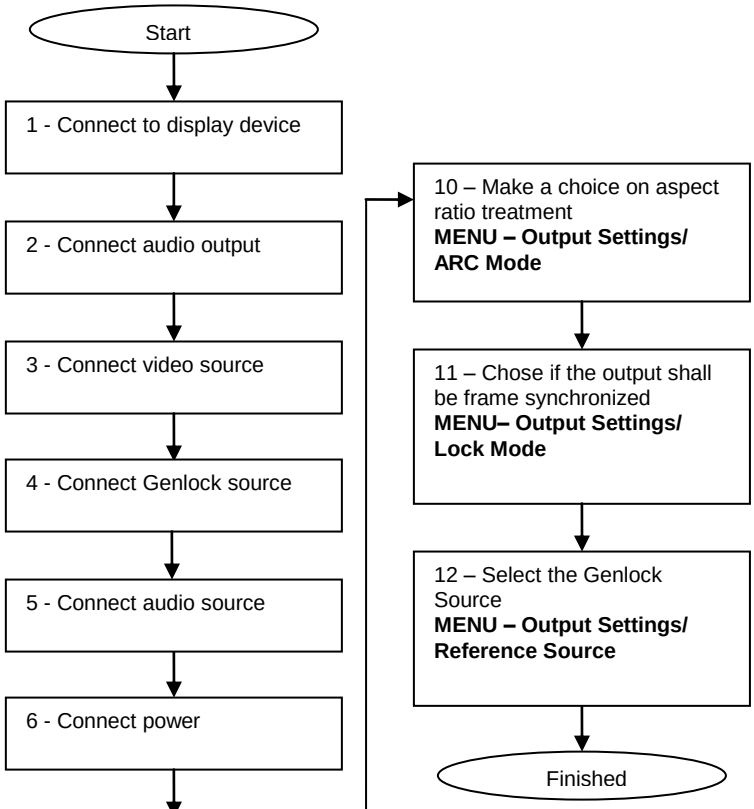
Vertical frame synchronisation is provided. The frame signal can be derived from the dedicated analogue Genlock source as a bi or tri-level sync or from the dedicated 3G-SDI Genlock source. The frame synchronisation signal must be a video format and must have a vertical rate of 50Hz, 59.94Hz or 60Hz. The output will be vertically locked to the frame synchronisation signal at the exact same rate. The phase can be controlled through the menu system, allowing adjustment for a desired latency.

Frame synchronisation status is shown via the front panel status indication on the right-hand side of the screen, provided it has been enabled on the menu.

SIERRA VIDEO

FLOW CHART FOR SP-14 OPERATION

3.1. Correct Installation Order



FRONT PANEL CONTROL

4.1. Menu Tree

- Start up Screen
- Main Menu
  - MEMC/FRC Settings
    - FRC Level
    - MEMC Exclusion Zone
      - Enable MEMC Mask
      - Display Border
      - Left Edge
      - Right Edge
      - Top Edge
      - Bottom Edge
    - MEMC Demo Mode
    - Output Cadence
    - Cadence Detect 23-30Hz
    - Cadence Detect 50-60Hz
    - Advanced
      - Robust SAD Threshold
      - SAD Cost Factor
      - Temporal/Spatial Balance
      - PPC Cost Threshold
      - PPC MV Smooth Threshold
      - PPC Selection Threshold
      - BG/FG Balance Cost
      - Huge Motion Dist Threshold
      - Huge Motion Fallback Gain
      - MV Outlier Threshold
  - Time Code Settings
    - Timecode Output
    - Timecode Source Select
    - TC Load Trigger Mode
    - Timecode Source Trigger
    - Timecode Prerun Period
    - Timecode Output Load
    - TC Load Now
    - TC Drop Frame Mode
    - TC In Frame Count Max
    - TC Out Frame Count Max
    - TC Processing Delay Offset (ms)
    - TC Source Format
    - TC Output Format
  - Source Select
  - Source Adjust
    - Proc Amp
      - Luma Gain
      - R-Y Gain
      - B-Y Gain
      - Luma Cutoff
      - R-Y Cutoff
      - B-Y Cutoff
      - Saturation
      - Hue
      - Black Level IRE
      - Source Gamma
    - Clock/Position
      - Clock Freq.
      - Clock Phase
      - Clock Aut-fit
    - Source Capture
      - Overscan
      - Source Window Shift Horiz
      - Source Window Shift Vert
    - Source Features
      - Sharpness
      - Detail
      - Unsharp Mask

- Aspect Ratio
  - AFD Mode
  - AFD Default/Forced
  - AFD Source
  - Trim Width %
  - Trim Height %
  - Pan Left/Right %
  - Tilt Up/Down %
  - Reset Trim Position
- Filters
  - CCS correction
  - CUE correction
  - ICP correction
  - 3D Y/C separation
  - Luma/Chroma delay
  - Luma peaking gain
  - CTI gain
  - CTI coring level
  - Temporal noise reduction
  - TNR & MNR noise reduction
  - MPEG noise reduction Level
  - Movie Mode

Output Settings
- Lock Mode
- Reference Source
- Reference Offset
  - Vertical
  - Horizontal
- Output Format
- ARC Mode
- ARC custom
  - H Crop/Side Panels %
  - V Crop/Letterbox Panels %
- Processing Mode
- 3G SDI Data Map
- Blue Check
- Safe Area Markers
- Gamma of Display

Audio
- Audio Source Select
- Source Pair 1 Mute
- Source Pair 2 Mute
- Source Pair 3 Mute
- Source Pair 4 Mute
- Output Pair 1 from
- Output Pair 2 from
- Output Pair 3 from
- Output Pair 4 from
- Group 1 Source from SDI
- Group 2 Source from SDI
- Audio Delay Offset (ms)
- HDMI Audio Source

Closed Captioning
- SD-SDI Output Standard

Information
- Firmware Version
- Bootloader Version
- Power Status Inlet B
- Power Status Inlet A
- Video Connection
- Audio Connection
- Source Format
- Source V Freq
- Source H Freq
- Output Format
- Output V Freq
- Output H Freq
- Reference Source
- Reference Format

- IP Address Type
- DHCP status
- IP address
- Subnet Mask
- Gateway IP
- MAC Address

Miscellaneous

- Select Test Pattern
- Status Display Mode
- Channel Logo Overlay
- Source Channel Config
  - Sources
    - Source Select Key
    - Native Modes in EDID ***(HDMI Only)***
    - Legacy Mode ***(HDMI Only)***
    - Color Space ***(DVI/HDMI Only)***
    - Color Range ***(DVI/HDMI Only)***
    - 3G Level B Stream ***(3GSDI only)***
    - Component Format ***(YPbPr only)***
    - Channel Reset
- No Sync Color
- Factory Reset
- Unit Configuration
  - Menu Timeout
  - Front Panel Backlight
  - Power Inlet Monitoring
  - Enable Automatic Keypad Lockout
- Networking (TCP/IP)
  - IP Address Type
  - Static IP address
  - Default Gateway IP Ad
  - Subnet Mask
  - Extended Network Prefix
- Presets
  - Load Preset 1
  - Load Preset 2
  - Load Preset 3
  - Load Preset 4
  - Copy to Preset
  - Reset 1
  - Reset 2
  - Reset 3
  - Reset 4
  - Rename 1
  - Rename 2
  - Rename 3
  - Rename 4

4.2. Introduction

The front panel displays information via a 4 line by 40 character display.

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

All data entry is via four direction keys, a Select/Enter key and a Menu/Escape key.

Some adjustments take time for the unit to complete; this will be indicated by the display showing **Busy** at the top of the screen. Further adjustments should not be attempted while the screen is showing Busy.

Use the Up and Down arrow keys to scroll to the parameter you need to adjust or the sub menu you want to enter to the top line of the window.
The LCD has four lines and can show only four menu items. An up arrow and/or down arrow symbol at the end of line 1 and line 4 indicate there are more menu items available. The parameter or sub menu is highlighted with a flashing cursor at the right edge of line 1 of the LCD. Pressing Select/Enter key enables you to adjust a parameter or enter the chosen sub menu. Use the Up/Down or Left/Right keys to adjust a parameter to the required value. Press the Select/Enter key again when the parameter has been adjusted to the required value.

```
[MEMC FRC Settings                  ]
 Time Code Settings
 Source Select              3G-SDI 1
 Source Adjust                      >
```

Some adjustments take effect immediately, but others do not take effect until the Select/Enter key is pressed for a second time. The changed settings are saved into non-volatile memory when the Select/Enter key is pressed for the second time.

Some adjustments are not applicable to all signal types or operating modes, in which case those non-applicable functions will not be accessible via the menus.

Special key combinations:

Press right arrow key at power up:	Enter Update Mode
Press up arrow key at power up:	Reset to factory defaults
While the menu is inactive, press right and left arrow key simultaneously:	Toggle through MCFRC demo modes 1st press: Video image tiled horizontally, right half w/ MCFRC processing, left half drop and repeat 2nd press: Video image tiled vertically, upper half w/ MCFRC processing, lower half drop and repeat 3rd press: Demo mode off again The area with MCFRC processing is surrounded by a grey rectangular frame.

4.3. Start-up Screen

The start-up screen shows the currently selected source signal, output resolution and provides information on the locking status.

```
IN: 1920x1080i  @50.00 Hz 3G-SDI 1
OUT:1920x1080i  @59.94 Hz Locked 59.94Hz

3G-SDI 1   C-YPbPr    HDMI      Test Pat
```

Under Time Code Settings the start-up screen can be configured to display such General Information or to display Time Code information. The display can also be toggled with the SOURCE key.

```
IN: 1920x1080i 50   Free Run
OUT:1920x1080i 59 00:00:00:00
MODE: Manual - Press 'ENTER' to load
3G-SDI 1   C-YPbPr    HDMI      Test Pat
```

4.4. Main Menu

The main menu lists the 9 sub menus. MEMC/FRC Settings, Time Code Settings, Source Select, Source Adjust, Output Settings, Audio, Closed Captioning, Information and Miscellaneous.

To set up your SP-14 it is recommended that you follow this procedure:

- Choose the output mode and parameters to suit the desired format you want to convert to.
- Select the correct source signal.
- Set the source levels and features appropriately to optimize the appearance of your image.
- Set any other parameters to suit your application.

Note: All Source parameters are specific to your chosen source channel and source signal type, they are not global to the unit. All Output and Miscellaneous parameters are global.

4.5. MCFRC Settings

4.5.1. Standard Settings

MEMC (motion estimation motion compensation) can be switched off by setting FRC (frame rate conversion) Level to Drop/Repeat.

FRC Level
MEMC is content adaptive. For very busy scenes the full blown MEMC algorithm (highest MEMC setting = Music & Commercial) may not give the best conversion result and less aggressive global conversion may do a better job. The FRC level can be set up from Documentary (lowest level) to Music & Commercial (highest level).

Across the range from Documentary to Music & Commercial there is a gradual increase in the aggressiveness of handling of larger foreground objects (independent motion) and a corresponding reduction in handling the background (motion due to camera movement – pan/tilt/zoom/rotate).

Instead of simply calling these MEMC levels Low through to High, the levels are given names that attempt to identify types of video content that would typically be appropriate for each level, as an aid to the user. However, there can of course be considerable variation in the style of content so some clips might need different settings to get the best results.

FRC levels Documentary, General Sport, Skiing, Football, Motor Sport: RGME (regional global motion estimation) mode is always on, and will enable blend when scene looks too busy.

FRC level General: Only enables RGME mode when scene is quite busy, and also enables blend when the scene looks too busy.

FRC levels Drama, Talk & Game Show, Music & Commercial: Never enables RGME or blend.

Note: RGME mode is a scheme for rapidly identifying accurate background motion by comparing large image blocks. This works best when the image is mostly background, but becomes less effective when there are lots of large foreground objects moving independently, and is not so useful if the background is static.

Note: MEMC is applied to sources with any of 23.98/24/25/29.97/30/48/59.94 and 60Hz frame rate. 50/60Hz VESA modes are covered.

Cadence Detection can be switched off (none accepted), limited to 3:2 and 2:2 or set to full detection (any accepted) mode. Off, Auto 2:2/2:3, Auto 2:2, Force 2:2/2:3, Force 2:2. When set to on filmic stutter of 3:2 or 2:2 or 23.98 or 24Hz material is preserved by applying a 2:2 (50Hz o/p) or 3:2 (50.94 and 60Hz o/p) cadence to the converted material.

A zone can be defined to exclude an area from the MEMC processing. When changing the values for the borders a white rectangular will mark the area being set up. The border can be switched on or off with the menu item Display Border. When Enable MEMC Mask is set to Invert rather than On, the outer of the area is masked out from the MEMC processing.

With the menu item MEMC Demo Mode the display can be tiled and one area is being MEMC processed, the other not. This allows a side by side comparison of the processing algorithms.

4.5.2. Advanced Settings

These parameters allow user optimisation of the Motion Estimation, Motion Compensation process, according to the nature of the video being converted.

By default, these settings are at “Auto” which means the values used are selected internally according to the MEMC/FRC level setting (Low, Medium and High), and sometimes changed dynamically according to various statistics that are measured frame by frame.

The settings and threshold values can be individually overridden from the automatic value to stages denoted as Minimum, Very Low, Low, Medium, High, Very High, Maximum. Changing these parameters may give better conversion results for certain isolated scenes depending on content.

The SP-14 algorithm for Motion Estimation is based on a technique called Phase Plane Correlation. This uses FFT analysis of corresponding blocks in two successive video frames, to quickly extract accurate details of motion quantity and direction. The PPC is applied repeatedly over a grid of overlapping blocks to generate a field of motion vectors. Typically, the majority will be very similar as they represent background motion, which is the apparent motion due to movement of the camera, the remainder being the independent motion of any (foreground) objects.

However, with real video scenes, there can be lots of different causes of confusion or ambiguity, so the Motion Vectors need to be individually checked and verified to avoid artefacts appearing in the output video. Problematic scenes have repeating structures, such as fences and railings, windows in a tower block, trees on a mountainside, ocean waves. Occlusions can be problematic, such as objects being hidden or revealed by the motion of other objects, or perhaps a door opening or closing.

The following terms and abbreviations are used in the menu descriptions:

PPC	Phase Plane Correlation
MV	Motion Vector, the direction and quantity of movement of a block within an image
SAD	Sum of Absolute Differences, which is an algorithm for measuring the similarity between two blocks of video image
BG	BackGround: that portion of a scene that only moves because the camera is moving
FG	ForeGround: objects or people in a scene that are moving independently of the camera
Outlier	A part of the image that is moving independently of the dominant motion

Cost — Cost factors are relative weightings used when assessing and applying different classes of candidate MVs

The following menu items can be changed:

Robust SAD threshold
Coring level for pixel noise filtering. Adjust this to improve robustness of MV detection especially when images are complex.

SAD Cost Factor
Default cost weighting

Temporal/Spacial Balance
Cost balance between matching motion vectors to the previous set of MVs or matching to neighbours in the current set.

PPC Cost Threshold
PPC selection threshold after applying appropriate cost factors.

PPC MV Smooth Threshold
Level of smoothing of flow of MVs by comparison with neighbouring blocks.

PPC Selection Threshold
Used when separating MVs from noise.

BG/FG Balance Cost
BG MVs should be similar to neighbouring MVs. FG MVs are independent.

Huge Motion Distance Threshold
Threshold to limit confusion between genuine fast motion of an object or false matching with nearby features that are similar.

Huge Motion Fallback Gain
Sensitivity coefficient for huge motion check.

MV Outlier Threshold
Validation error threshold for outlier MVs. Higher value means more likely to make a false MV between features that are similar but unrelated.

4.6. Time Code Settings

SP-14 processes time code information from SD formats on the analogue Composite, S-Video and Component sources. For 480i/NTSC lines 14/277 and 16/279 are scanned for time code (VITC). For 576i/PAL lines 19/282,21/284 are scanned for time code (VITC).

Also, time code information from SMPTE RP-188 ancillary data packets (DID = 0x60, SDID = 0x60) on the 3GSDI sources is processed. The packets are tagged internally with the associated incoming video frame, then sent out again on the 3GSDI output (only) when that frame reaches the output. Note that the frame-count part of the time is regenerated as per SMPTE 12M. Missing/corrupted source packets get replaced and frame-count on the output will match the output format.

Time Code Output
SP-14 allows to specifically switch off that time code information.

TC Source Select
The time code source can be either “Current Source' or ''Free-Run”, i.e. internal generation.

When “Current Source' mode is selected, the output time code will track the source received from the current video source. If that source consists of a series of clips with time code discontinuities at start of each new clip, then the output will change to match. If the source player is paused at any stage, but still outputting valid time code, then the SP-14 output time code will also be paused.

Note that the output tracking allows for differences that can arise as a result of either one of source or output being in 'NTSC time'. If the video format is 23.98Hz, 29.97 or 59.94Hz, then the associated time code will run slightly slower by comparison with real time, and is known as 'NTSC time'. If “Drop Frame Mode” is enabled, then this is compensated for by skipping two frames every minute, so the error is kept small.

If the currently selected video source channel hardware does not support time code (DVI, HDMI, Analogue, and Test Pattern) then the TC source selection option will say 'N/A' (not available). If time code source is supported by the video source channel hardware (CVBS 1/2, S-Video, 3G-SDI 1/2, and Y-CbCr) but there is no time code being supplied from the video source, then the output will just free-run. If time code is seen for a while at the source, and then it stops, the output will continue, but free-running based on the last time code seen.

When “Free-Run” is selected, then the time code output will be generated inside the SP-14, but can be reset to any start value by the user, as required.

TC Load Trigger Mode
This menu item is used to select how the reload process happens. “Free-Run Manual” means the output is changed immediately on demand whenever the user chooses “Time Code Load Now” in the menu.

The 'Synchro' options under “TC Load Trigger Mode” require the current video source to also have time code attached, so when the source time code matches the “Timecode Source Trigger” value, the output time code will be the “TC Output Load' value. The different options provide several alternative ways of specifying how much continuous pre-run time is included in the output time code before the trigger point is reached:
- “Synchro Auto” will start pre-run as soon as the source time code has been stable for 5 seconds
- “Synchro Prerun” will start pre-run at the offset entered by the user for the “Timecode Prerun Period'
- 'Synchro Manual' will wait until the source time code has been stable for 5 seconds and then the user can start pre-run at any point until the trigger time by choosing “Time Code Load Now” in the menu.

TC Source Trigger
Set time code source trigger value for synchronisation of the internally generated time code with the time code provided by the video source.

TC Prerun Period
Set output time code pre run period.

TC Output Load
Set the output time code start value, which is then triggered either manually or through the synchronisation described above.

TC Load Now
Press this button to start the time code output with the “TC Output Load” value manually.

TC Drop Frame Mode
This mode is used for 29.97 or 59.94Hz output formats, to specify if drop-frame compensation is to be applied or not.

TC In Frame Count Max
Specifies how many frames per second to expect on the source time code - which is important to know for the synchronisation calculations. Options are :
- “Detected”, i.e. what can be seen on the incoming time code
- “Format”, i.e. what it should be for the source video format
- “24”, “25”, “30”, i.e. user override to one of 24, 25 or 30Hz. For this purpose, 23.98 and 29.97Hz are equivalent to 24 and 30Hz respectively. Also, progressive 50Hz and 59.94/60Hz video formats use the field flag as the lowest frame count bit, so use the 25 or 30Hz setting.

TC Out Frame Count Max
Specifies how many frames per second to generate on the output time code. If it is intended that the output video is to be later replayed at a different speed, then the correct time code can be generated here. Options are:
-“Format' which uses the output video format to derive the frame count
-“24”, “25” or “30”, i.e. user override to one of 24, 25 or 30Hz.

TC Processing Delay Offset (ms)
The delay of the time code information through the system can be fine adjusted, e.g. to compensate for video to time code delays within the material and/or processing chain.

TC Source Format
Source options are auto, embedded LTC and embedded VITC. Auto accepts either LTC or VITC, but takes the first seen (lowest line number) if both are provided. Settings are stored per source channel. This applies for SDI video source channels only. Analogue source channels can only carry VITC information.

TC Output Format
Output options are embedded LTC, embedded VITC, embedded LTC+VITC, and none (no time code put on the data stream).

Status Display Mode
Changes the information being displayed on the LCD from general information on the video modes to time code information.

Source Select

The list of available sources can be scrolled through using the Up and Down arrows. The new source is not selected until the Select/Enter key is pressed again. The list of sources are:

DVI, HDMI, Analogue, 3G-SDI 1, 3G-SDI 2, S-Video, Component, CVBS 1, CVBS 2 and Test Pattern.

Test patterns can be generated by SP-14 without needing an source connected. When Test Pattern is selected as the source, the required test pattern can be chosen from the Source Channel Config section of the Miscellaneous menu or with the menu off by toggling through the test patterns with the up and down keys.

NB: Some complex test patterns can take many seconds to draw, during which time the screen will be blank and the LCD will indicate “Busy”. This is not a fault.

4.7. Source Adjust

This menu contains adjustments associated with setting up sources to the unit. Use the Up and Down arrows to scroll to the required sub-menu and press the Select/Enter key to enter the sub-menu. The following sections list the sub-menus.

4.7.1. Source Levels

This menu contains parameters related to the level and colour of the source signal.

Luma Gain
Control of luma gain

R-Y Gain
Control of colour gain

B-Y Gain
Control of colour gain

Luma Cutoff
Control of luma offset

R-Y Cutoff
Control of colour offset

B-Y Cutoff
Control of colour offset

Saturation and Hue
Control of video saturation and hue

Black Level IRE
Used to select 7.5 IRE black level set-up adjustment

Source Gamma
Set the Gamma to match the source source

4.7.2. Clock/Position

For analogue graphics sources only, clock auto fit can be selected to automatically adjust the frequency and phase of the sampling clock. This automatic adjustment is strongly recommended. The clock phase and frequency can also be adjusted manually if needed.

4.7.3. Source Capture

Overscan
Select the amount of overscan, effectively up-scaling the image slightly. Maximum overscan is 10%, minimum is 0%.

Source Window Shift
Allows horizontal and vertical adjustment of the captured active image area within the overall display resolution. Note: The range of position adjustment available is limited by the characteristics of the signal timings from the image source equipment.
The source window shift function should only ever be used to correct source capture discrepancies.

4.7.4. Source Features

The source feature menu provides three image enhancement functions.

Sharpness

Control of the sharpening enhancement. These are peaking filters to improve high-frequency response. Note: setting this control too high on a signal which already has good high frequency response will cause ringing or ghosting.

Detail Enhance
Provides an additional level of detail enhancement beyond that provided by the Unsharp Mask

Unsharp Mask
This is a very powerful function which performs a per-pixel unsharp mask on the image content. It can be used to greatly improve detail definition and clarity without causing image ringing or ghosting. It improves both horizontal and vertical detail.
Correct setting of the Unsharp Mask filter can make SD signals look virtually indistinguishable from true HD.

4.7.5. Aspect Ratio

AFD Mode
Video signal streams may include information describing the transmitted format (HDMI: AVInfoFrames, Composite NTSC/PAL: WSS/CGMS-A, 3GSDI: Generic SMPTE2016). The AFD signal (Active Format Description) is automatically considered by SP-14 when AFD Mode is set to Auto. Essentially, this feature switches on the detection of the aspect ratio of the incoming video signal. The ARC (Aspect Ratio Conversion) settings in the Output Settings menu determine how this information is processed. The AFD Mode can be set to Forced, in which case the AFD markers are ignored and the aspect ratio is said to be what is set under the menu item AFD Default/Forced, whether or not that is actually the case.

AFD Default/Forced
When the AFD information is missing or corrupted or when AFD Mode is set to Forced this menu determines what aspect ratio the source signal is assumed to have for further processing.
If it is set to 16:9 or 4:3 the incoming video signal is considered to have that aspect ratio.
Keep Last means use whatever was seen before. If nothing was seen before use 4:3 for SD modes and 16:9 for HD modes.

AFD Source
From this menu AFD, WSS/CGMS-A or Video Index may be selected as AFD source. The sources for aspect ratio information for the source channels are as follows:

HDMI: From the AVInfoFrames (see CEA-861-D)
DVI and VGA: none available - all source formats assumed to be square pixel, hence aspect ratio can be calculated from the resolution (except 576i, 480i, 576p, 480p if accepted, which are all 4:3)
SD/HD/3G-SDI: User choice of AFD packets (as SMPTE 2016) or legacy support for Video Index (SMPTE RP186)
CVBS/S-Video/YCbCr: WSS or CGMS-A packets, according to format. PAL/576i uses WSS (BT.1119-2); NTSC/480i,720p,1080i use CGMS-A (CEA-805/IEC 61880/EIAJ CPR-1204/etc)

Trim Width % and Trim Height %
The video image can be scaled independently in the horizontal and vertical direction. Black bars are added on top and bottom of the image when a shrink is performed.

Pan Left/Right % and Tilt Up/Down %
The zoomed image can be paned in horizontal and vertical direction with these controls.

Reset Trim Position
Resets all trim and pan settings to zero percent.

4.7.6. Filters

A submenu containing selection options for many image clean-up filters including:

CCS	Cross Chrominance Suppression filter (reduction of chroma-crawl) – SD only
CUE	Chroma Up sampling Error correction filter
ICP	Interlace Chroma Problem filter, reduces interlace errors on diagonals & curves
3D Y/C	Filter to reduce luminance to chrominance cross talk of composite video signals which appears as a coarse rainbow pattern or random colors in regions of fine details.
Luma/Chroma delay	Adjustable delay between chroma and luma of +/- 3 pixels.
Luma peaking gain	Luma transient steepening.
CTI gain	Chroma transient steepening.
CTI coring level	Threshold to CTI to avoid noise being amplified
TNR	Temporal Noise Reduction (removes "electronic" noise found on broadcasts, film material)
TNR & MNR	Selects which noise reduction filters are applied – TNR only, TNR+MNR, or Auto for automatic image content and noise based selection of filters.
MPEG NR Level	Adjusts the level of MNR (MPEG Noise Reduction) for SD signals. Not applicable to HD formats – use TNR for removal of all types of noise from HD formats.
Movie Mode	Movie Mode is set to Auto by default. SP-14 detects film content converted to video and applies the inverse telecine process. In the unlikely event that this automatic detection fails the unit can be forced to treat the incoming signal as either video or film. When set to video motion adaptive de-interlacing is applied. This setting will eliminate all feathering that may appear in Auto setting, but image detail is reduced for film originated content. The Film setting will apply an inverse telecine process no matter of the content. This will give great detail for film originated content video. If the content is video this setting shows unacceptable feathering. When such artefacts are observed the Video or Auto setting is more appropriate.

4.8. Output Adjust

This menu contains adjustments associated with setting up the outputs of the unit. Use the up and down arrows to scroll to the required sub-menu and press the Select/Enter key to enter the sub-menu. The following sections list the sub-menus.

4.8.1. Lock Mode

The unit output can be run with a fixed format set under Output Format or locked to a frame synchronisation signal provided on the dedicated analogue genlock source or SDI genlock source.
The genlock signal must be a video format and must have a vertical rate of 50Hz, 59.94Hz or 60Hz. The output will be vertically locked to the genlock signal. The phase can be controlled through the menu system, allowing adjustment for a desired latency.
Genlock status is shown via the front panel status indication on the right-hand side of the screen, provided it has been enabled on the menu.

There are the two locking options: Auto Format and Frame Synchronize.

With Auto Format the output mode is chosen to be the same as the mode provided on the genlock source regardless of the setting under Output Format.

Frame Synchronize uses the mode set under Output Format. Locking a HD output mode to a SD genlock signal or a SD output mode to a HD genlock signal is possible at 50Hz and 59.94Hz when the genlock signal and frame rate of the mode set under Output Format are identical. The HD output mode can be chosen to be 720p, 1080i, or 1080p. If the genlock signal and output mode set under Output Format are both HD or SD the output format and genlock signal format need to be identical to obtain a lock.

Combinations not supported are reported in the menu status screen accordingly.

4.8.2. Reference Source

The source for the frame synchronisation signal can be either an analogue bi- or tri-level signal or derived from an SDI signal which is set through this menu item.

4.8.3. Reference Offset

When the output signal is locked to the source signal the latency between source video and output video image is given by the internal processing time which can be several frames or fields. The amount of latency in frames or fields depends on the set up of the unit and also on the source format, e.g. a progressive signal needs less processing time than an interlaced signal which has to be de-interlaced prior to further treatment. The reference offset menu allows to increase the latency.

Vertical
Increase the latency in multiples of lines.

Horizontal
Increase the latency in multiples of pixels.

4.8.4. Free Run Format

The unit can be set to operate at a fixed output format. The unit is performing time base correction. The following output formats can be chosen:
480i59.94, 576i50, 720p50, 720p59.94, 720p60, 1080i50, 1080i59.94, 1080i60, 1080sf23.98, 1080sf24, 1080sf25, 1080p23.98, 1080p24, 1080p25, 1080p29.97, 1080p30, 1080p50, 1080p59.94, 1080p60.

4.8.5. ARC Mode

Select from Bypass, Anamorphic 25%, Panels/Letterbox 25%, Crop 25%, 14:9, Flex Wide and Custom.

Bypass will scale the image to full screen.

Crop 25% makes a 4:3 fit a 16:9 by chopping off top and bottom; or makes a 16:9 fit a 4:3 by chopping off (25% off) left and right.

Anamorphic 25% is for 4:3 SD outputs only, it linearly compresses a 16:9 image into 4:3 without cropping or added bars.

Panels/Letterbox 25% will add bars (25% vertically in total) above and below for a 16:9 image on a 4:3 SD output, or add bars (25% horizontally in total) at the sides of a 4:3 image on a 16:9 output.

14:9 will crop part of the sides of a 16:9 image to make it 14:9 and scales it to fit horizontally on a 4:3 SD output. This will add small bars on top and bottom. For a 4:3 image the bottom and top will be cropped to make it 14:9 and scales it to fit vertically on a 16:9 output. This will add bars to the sides.

Flex Wide is applying a non-linear stretch horizontally to convert a 4:3 into 16:9 with the emphasize of aspect ratio conversion in the center of the image.

Custom allows user to specify a zoom horizontally and/or vertically starting with full screen scaling.

Note: Some aspect ratio selections will have no visible effect on the displayed image for certain source and output mode combinations, e.g. if the source and output formats have the same aspect ratio letter boxing and cropping have the same effect as bypassing.

4.8.6. ARC Custom

H Crop/Side Panels and V Crop/Letterbox Panels
When ARC mode is set to Custom this menu becomes available. The output image can be further scaled up and down individually in horizontal and vertical direction. When shrinking black bars are added to the non-used panel region.

4.8.7. Processing Mode

Best Picture
Noise reduction and motion-adaptive de-interlacing operate in this mode to give the best quality picture. There is optional MPEG noise reduction for SD interlaced sources. Typical latency is 5-8 frames, worst case is 9 frames. Exact latency depends on whether the source is progressive or interlaced which noise reduction filters are enabled and whether frame synchronisation is enabled. Motion compensated frame rate conversion also adds extra latency.

Low Latency
In this mode noise reduction and motion-adaptive de-interlacing are disabled which allows the delay through the unit to be reduced to 3 frames in free run mode or 2 frames when frame synchronising.

4.8.8. 3G-SDI Data Map

SP-14 allows to convert and output 3G-SDI video in various formats which are 10 Bit 4:2:2 or 10 Bit 4:4:4 component video, 10 Bit 4:4:4 RGB and 12 Bit 4:4:4 X'Y'Z'. For 1080p50, 59.94 and 60Hz modes either Level A or B transport scheme can be set.

4.8.9. Blue Check

The live video output image blue, green, red and white (luma) content can be separated and displayed individually when selecting the respective component through this menu.

4.8.10. Safe Area Markers

Safe area markers will show a maximum window of the output image with the format set up under this menu. Available aspect ratios are 4:3, 14:9 and 16:9.

4.8.11. Gamma of Display

Allows to change the gamma correction to match the gamma of the display.

4.9. SP-14 Audio

Audio source channels are the 4x AES coaxial connectors and audio embedded in HDMI and SDI video streams for SP-14.

The audio is passed through the system and re-embedded into the HDMI and SDI output signals with an appropriate delay to synchronize with the video stream.
Also, audio output is present on the respective 4x AES coaxial connectors. Any PCM audio of 32kHz, 44.1kHz, and 96kHz is resampled to 48kHz.
Higher sample rate PCM audio such as 192kHz is muted.
Any compressed audio is passed through if the original audio is identified as 48kHz sampled audio or muted.
Incoming Dolby E audio is muted.

Output Channel	Output Format
HDMI	PCM up to 8ch, up to 24Bit, 48kHz sampling rate Dolby Digital (AC3) up to 5.1 channels, up to 640kBit/sec bit stream rate MPEG2 up to 8ch, up to 112kBit/sec bit stream rate DTS up to 6.1 channels, up to 1536kBit/sec bit stream rate
SDI	PCM up to 8ch, up to 24Bit, 48kHz sampling rate
4x AES	PCM up to 8ch, up to 24Bit, 48kHz sampling rate Dolby Digital (AC3) up to 5.1 channels DTS up to 6.1 channels

4.9.1. Audio Channel Configuration

SP-14 has 4x two channel AES audio outputs and embedded audio on the HDMI and SDI video output ports. These audio outputs carry the embedded audio of the select video source stream (HDMI or SDI) or audio source on the 4x two channel AES audio sources. Also, an internally generated test tone can be sent to the audio output channels. The audio routing can be controlled with the following menu items:

Audio Source Select
This setting determines whether embedded audio of the selected video source (HDMI or SDI) or AES audio or a test tone is sent to the audio output channels. Also, the audio can be muted globally for all channels in this menu.

Source Pair 1 Mute, Source Pair 2 Mute, Source Pair 3 Mute, Source Pair 4 Mute
By default embedded audio and AES audio is passed through the system if the hardware does not need to decode and encode compressed audio for resampling or is capable to resample PCM audio (see table above).
The system can be forced from this Auto mode to Always or Never for each audio source channel individually. Always mutes the channel and Never let all audio data pass through the system regardless of hardware limitations.

Output Pair 1 from, Output Pair 2 from, Output Pair 3 from, Output Pair 4 from
By default the audio output channels get the audio source channels in sequential order. Each audio output channel can be assigned a different audio source channel or they may all get the same signal.

Group 1 Source from SDI, Group 2 Source from SDI

An SDI signal may carry 8x two channel audio signals.
The SDI receiver used in SP-14 is only capable of making 4x two channel audio signals available to the audio processing system at a time. This menu item allows to route certain SDI audio groups to the audio source channels of the SP-14 audio processing system.
SDI audio channels typically use the following nomenclature for the audio channels in sequential order: Group 1 Pair 1, Group 1 Pair 2, Group 2 Pair 1, Group 2 Pair 2, Group 3 Pair 1, Group 3 Pair 2, Group 4 Pair 1 and Group 4 Pair 2.
Our 4x two channel AES audio ports and the 8x (single) HDMI audio channels are identified as Source/Output Pair 1, Source/Output Pair 2, Source/Output Pair 3, and Source/Output Pair 4 in the menu system. In the SDI routing menu we use the terms Group1 (1,2), Group2 (3,4), Group3 (5,6), and Group4 (7,8) for the selectable items to make the connection to our pair terminology.
When Group 1 Source from SDI and Group 2 Source from SDI are set to auto, the system will route the first 4x two channel SDI audio signals (which actually transport audio) to the 4x Source Pairs of the SP-14 audio processing system. This can be overwritten, e.g. Group 3 SDI audio can be put on our Source Pair 1 and Source Pair 2 and Group 4 SDI audio can be put on our Source Pair 3 and Source Pair 4.

4.9.2. HDMI EDID control and Audio Delay

HDMI Audio Source
Allows the user to set the format of the HDMI audio channel. Use to choose how many channels of audio are requested from the HDMI source equipment. By default the processor allows 8 channels (7.1) of audio to be sent by a source. This EDID information can be overwritten to reduce the number of incoming channels.

Audio Delay
The audio delay is automatically set to compensate for the latency through the unit. The Audio Delay adjustment does not override this automatic setting but allows fine calibration of the audio delay in steps of approximately 1mS, to advance or retard the audio so as to compensate for further delays in your display device or your audio system.

4.10. Closed Captioning

SP-14 can receive and transmit closed captioning information. CEA-608 CC information can be received on the Composite, S-Video and Component sources. For 480i/NTSC line 21/284 are scanned for CC information.

SMPTE 334M ancillary data packets with CEA-608 information (SDID = 0x02) or CEA-708 CC information (SDID = 0x01) incl. embedded CEA-608 CC data can be received on the SDI sources. The CEA-608 CC information is extracted and put on the component output when output resolution is set to 480i. The whole packet is passed through unchanged to the 3GSDI output port for all output formats set.

CEA-608 CC information from the analogue sources is transmitted on the YPbPr output when set to 480i output resolution (on line 21/284). On the 3GSDI output closed captioning information is put into a SMPTE 334M packet (SDID = 0x01) as embedded CEA-608 CC information and also transcoded to equivalent CEA-708 CC information. This packet gets sent on the SDI output for all output formats.

SP-14 by means of a menu item allow the user to select the CC standard to use for the 3GSDI output, when the output format is 480i or 576i. The choice available is either CEA-708 encoded CC data (which includes embedded CEA-608 codes) – the default; or original CEA-608 data, which is sent in a packet as described in Annex A of SMPTE 334-1. The user might need this second option if the output is feeding legacy equipment that does not understand the newer CEA-708 formats.

The CC processing code supports any combination of source and output (subject to hardware limitations of which channels actually support CC).

CC messages are drip fed, especially for CEA-608, which gives a fixed rate of two characters per field, every field (each pair could be text, or a control code, or just nulls to fill the space until the next message). So, if you convert a high-field rate source to a low rate output, then the nulls between messages will be reduced so each message starts in about the same place in the video sequence.

Similarly, if the rate is increased then more nulls are introduced between the messages. This applies equally whether in Drop/Repeat mode, or doing frame rate conversion.

CEA-708 has a more complex packet structure which allows for a variable amount of data per packet, but the overall principal still applies.

4.11. Information

Displays information about the current configuration of the unit. Use the up and down arrows to scroll to the required values. Information provided is the revision number of the firmware loaded to the unit, the status of the power inlet, which video and audio connection is active, information on the source and output mode, status of frame synchronization and TCP/IP related information, such as the address assigned to the unit.

4.12. Miscellaneous

This menu contains miscellaneous parameters generally associated with setting up the configuration of the whole unit rather than source or output parameters. Use the up and down arrows to scroll to the required sub-menu and press the Select/Enter key to enter the sub-menu. The following sections list the sub-menus.

4.12.1. Select Test Pattern

When Test Pattern is selected as the source channel the required test pattern can be selected here. Test Patterns can also be changed with the up/down keys directly when the root menu with the status information is up.

4.12.2. Channel Logo Overlay

A channel logo can be overlaid on the video image. Logo location can be set to be in the top left, top right, bottom left or bottom right corner. How to upload a logo bitmap is described in paragraph 5.4.

4.12.3. Source Channel Config

This menu allows configuration of the various source channels. Scroll to the Source Channel Config menu. Press the Select/Enter key. Scroll to the Source you want to configure and press the Select/Enter key. The following items are available for each channel.

Source Select Key
There are 4 select buttons on the front of the unit which can be associated with sources; these are used for quick selection of sources.

Native Modes in EDID (HDMI only)
This is to allow the unit to be seen by a source to operate with a preferred video source mode. Some sources output a de-interlaced SD signal automatically and they can be forced to output an interlaced output.

Legacy Mode (HDMI only)
Puts the unit into HDMI 1.1 mode to support older sources which are unable to operate correctly on seeing an HDMI 1.3 receiver. This can happen with some HDMI repeaters which copy EDID data from the unit where that data exceeds the source equipment's own HDMI capability.

Colour Space (DVI/HDMI only)
Some HDMI sources or repeaters may not output in the color space they report. Some DVI sources may not output in the RGB colour space. Their output colour space can be forced with this setting.

Colour Range (DVI/HDMI only)
Some HDMI sources or repeaters may not output in the color range they report. Some DVI sources may not output in the full colour range. Their output colour range can be forced with this setting.

Component Format (Component only)

For analogue Component Video sources only, select whether the source source provides YPbPr, YPbPrS, RGB or RGBS video. It is also possible to choose between 0.7v and 1.0v video levels on the component sources. Most sources provide 0.7v video, plus 0.3v sync, but some do provide 1.0v (excluding syncs).

Incorrect format selection will cause severe color errors or loss of stable picture, incorrect level selection will cause the picture be very dim, or cause peak whites to be compressed.

Channel Reset
The configuration for an source channel can be removed by performing a channel reset.

3GSDI Level B Stream (3GSDI only)
When source is 3G Level B (2 stream mapping), there is an option to select which of the two video streams (Stream 1 or 2) to use. Otherwise it works with whatever mapping is specified in the SMPTE 352 packet (or defaults to 10bit 4:2:2 if none).

Select Test Pattern (Default)
When Test Pattern is selected as the source channel the default test pattern can be selected here.

4.12.4. No Sync Color

Defines the output background color when no valid source signal is detected on the current selected source. Options are Blue, White, Orange and Black. Default is Black.

4.12.5. Factory Reset

Factory reset puts all settings in the unit back to factory defaults. Note: A factory reset can also be issued at power up (or reset) by pressing the up arrow of the keypad. The up arrow key needs to be kept pressed until the “Resetting to factory defaults ...” message is shown.

4.12.6. Unit Configuration

Menu Timeout
Sets the time for the front panel to go back from displaying the current menu to display the top level menu

Front Panel Backlight
Sets the brightness of the front panel backlight

Power Inlet Monitoring
Determines whether the power inlets are monitored. When the inlets are monitored a failing inlet is indicated by a message and a flashing LCD menu.

Enable Automatic Keypad Lockout
By default the keypad is locked. It can always be unlocked by pressing the sequence of Enter and Source key. Once a button is pressed this key sequence is identified with a message. The keypad unlocking is timed out after 15 seconds of not continuing pressing keys. This time out can be disabled here.

4.12.7. Networking(TCP/IP)

The IP address type (static or DHCP), IP address, subnet mask and extended network prefix can all be entered here.

4.12.8. Presets

The current system configuration can be stored using Copy to Preset and can then be recalled later using Load Preset. There are 4 presets available including the current one. Any preset can be reset using the Reset command and renamed using the Rename command.

REMOTE CONTROL WEB SERVER

5.1. Introduction

The unit features a web server which connects to a PC web browser via TCP/IP. The menu system of the unit is mirrored into the web browser and all menu items can be accessed and controlled through the keyboard or mouse of the PC.

5.2. Installing the Software

No extra software needs to be installed on a PC. The PC web browser is used as the graphical user interface for all control items. To connect to the unit the TCP/IP address has to be entered into the address list box of the web browser in the following format http://xxx.xxx.xxx.xxx. The TCP/IP address assigned to unit can be found in the Information menu.

5.3. Software Operation

Once the address has been entered into the web browser starts to load pages from the unit mirroring the menu system of the unit. All menu items are shown as their respective buttons, sliders and list boxes and can be accessed and altered with the PC mouse or corresponding navigational key presses.

5.4. Channel Logo Upload

The web browser has an element to upload a channel logo bit map into the file system of the unit which can be activated and changed in position through the Channel Logo Overlay menu item.

FIRMWARE UPDATE

6.1. Introduction

Firmware can be updated in the field through the USB port allowing feature upgrades and bug fixes. The USB port is located on the rear side of the unit. Thus, if the unit is rack mounted and access to the rear panel is hindered a USB extension cable may be attached to the USB port and lead through the front.

6.2. Installing the PC Updater Software

Firmware update is supported by a PC based updater tool. Download this tool from our Website. Installation of the PC Updater is through a standard Windows installation packet. Double click on the single installation packet file and follow the instructions provided on screen thereafter.

6.3. Updating Firmware

To update firmware the unit has to be put in a special service mode.
Attach the USB cable only after entering the service mode.
This is achieved by pressing the right key on the front panel and keep pressed at power up or reset. Release the right key button after power is applied or the reset key is released.
The reset key is accessible through a small bore in the lower left corner of the front panel.
To power down/up the unit the mains cables have to be removed and attached again. Obviously, this is less convenient. The unit indicates it is in service mode when the power down/up method was used by an Updater Mode message in the front panel display. When using the reset method the front panel key preserves the information that was present prior to reset and the standby key is highlighted red. Other key illumination is switched off.

ENVIRONMENTAL AND EMC

7.1. Recommended Operating Conditions

Temperature	0°C to 40°C
Humidity (non condensing)	0% to 95%

7.2. Storage

Temperature	-25°C to $+85^{O}$C
Humidity (non condensing)	0% to 95%

7.3. CE and FCC Compliance

CE: This product complies with the requirements of 89/336/EEC Electromagnetic Compatibility Directive amended by 92/31/EEC and 93/68/EEC, and 73/23/EEC Low Voltage Directive. Compliance is to EN55022 Class A.

FCC: **WARNING:** This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause interference to radio communications. Operation of this equipment in a residential area is likely to cause interference in which case the user will be required to correct the interference at their own expense.

The user is cautioned that changes and modifications made to the equipment without approval of the manufacturer could void the user's authority to operate this equipment.

It is suggested that the user use only shielded and grounded signal cables to ensure compliance with FCC rules.

ABBREVIATIONS

This section expands abbreviations peculiar to video applications which may be used in this manual.

AFD	Active Format Description
ARC	Aspect Ratio Convertion
CVBS	Composite Video Baseband Signal
DDC	Data Display Channel
DVI	Digital Visual Interface
EDID	Extended display identification data
HDCP	High-bandwith Digital Content Protection, a digital copy protection mechanism
HDMI	High Definition Multimedia Interface
MCFRC	Motion compensated frame rate conversion
MEMC	Motion Estimation Motion Compensation
NTSC	National Television Systems Committee (USA, Canada, Japan TV standard)
PAL	Phase Alternating Line
RGB	Red, Green, Blue analogue video
RGBS	Red, Green, Blue analogue video with Synchronization siganl
SDI	Serial Digital Interface
SECAM	Systeme Electronique Couleur Avec Memoire **-** TV broadcast standard used in France, Middle East and most of Eastern Europe.
SMPTE	Society of Motion Picture Television Engineers
SVGA	Super VGA
TC	Time Code
Y/C	Luminance (Y) and Chrominance (C), also called S-video
YPbPr	Luminance (Y) and red, blue colour difference signals (Pb), (Pr)