We offer both simple and sophisticated products for adding graphics to video sources. Use the LKEY 3 linear keyer for the simple keying of one graphic. The MultiLogo three-layer logo keyer is a powerful video and audio branding tool with internal storage for up to 500 graphics.

Sports graphics

Our easy-to-use and space-saving Safire real-time chroma keyers use their acclaimed digital chroma keying to create realistic 3Gb/s, HD or SD virtual images – making them ideal for any live virtual production.

Because

The Indigo product range

Crystal Vision makes the full range of interface products for 3Gb/s, HD and SD sources. These include the best glue products in their price range – products that win evaluations for the big projects. Most include multiple functionality on a single board which helps save you money and rack space – while some even feature integrated fibre input or output connectivity for even more functionality in a single frame slot. Crystal Vision will always give you features that you won’t find anywhere else. Our up and down converters’ ability to maintain signal quality wins them side-by-side evaluations, while our synchronisers and embedders give you real freedom when it comes to manipulating and processing multiple groups of embedded audio, and our routing switches will guarantee you a clean switch with a full framestore synchroniser on each input and loss of reference protection.

Logo keying

Any bluescreen or greenscreen application

Virtual studios

Sports graphics

Crystal Vision provides project-winning interface and keying modules to those involved in the professional broadcasting industry. As a main modular supplier we are able to provide all the essential ‘broadcast plumbing’ for your installation, while we are also known for our more specialist products – such as the chroma keyers used by broadcasters across the world. There’s a choice of two product ranges: the Indigo range for the biggest selection of boards and frame sizes, and the forward-looking Vision range for those planning IP and 4K installations or who are seeking the maximum outputs from their SDI products.

With reliable multi-functional products, responsive customer support, quick delivery and a five year warranty, Crystal Vision is a company that people like dealing with.

Line idsents

The Clip N Key clip store allows a special clip to be played repeatedly – ideal for providing wipes.

Weather

Shadowbox media solutions

Interface

Chroma keying

Virtual studios

Everything modular from Crystal Vision...

Line idsents

Wipes

Logos

Sports graphics

More at www.crystalvision.tv...
people like dealing with us

Why you should choose Crystal Vision

Because people like dealing with us...

- Excellent product features with clear technical advantages – and good enough to win the big projects.
- The feature-packed (and often multi-functional) products provide excellent value for money.
- Our quick delivery wins us orders. In fact, we aim to deliver 80% of all orders involving one or two frames within a week of that order being placed – and we usually do. We hold a large quantity of stock – and that includes stock of every product.
- The best technical support. Quick troubleshooting comes from the full rack of equipment we have set up to mimic any customer installations – and people say it’s a refreshing experience to deal with us. Plus our system design experts can advise you how best to use our products to save yourself both rack space and money.
- The products are quick and easy to set up – with comprehensive documentation available (or the customer support team at the end of a phone or e-mail).
- It’s easy to buy the products. We have a wide distribution network, with attentive and knowledgeable salesmen and distributors located across the world.
- A choice of frames to suit your application perfectly. The Indigo frames are available in three sizes (whether you need to house 12 boards or two), and our products are space-saving modules – with up to 12 fitting in just 2U of rack space. Alternatively you can fit up to 20 cards from the Vision product range in our 3U Vision frame.
- A choice of control. Select what you prefer, from board edge switches, an active front panel on the frame, various remote control panels, GPs or SNMP or VisionWeb Control from a web browser.
- Extremely reliable (and long-lasting) products, with the added reassurance of a five year back-to-base warranty. Should there be a problem, you won’t have to wait long: we’ll normally fix your board or get a replacement to you within five days.
- We listen to the products and extra features you want.

How to find the product you need

Use the Contents on the right to go straight to your product area of interest. Or if you know the product name, use the A-Z Index on the back page. Once you’re on the page you need, the symbols show at a glance which features each product offers, while the comparison charts allow you to compare the products side-by-side. With the rear module diagrams you can see the inputs and outputs you’ll get with a particular rear module – and so easily select the best one for your application. If you want more detail, individual leaflets are available for each product or you can explore our website at www.crystalvision.tv where things are always up-to-date. A separate Product Range catalogue is available for the Vision system.

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- AFD insertion and reading 14 – 18, 25 – 27
- Aspect ratio converter 25, 14 – 18
- Audio converters 43
- Audio embedders/de-embedders 39 – 42
- Audio processor 46
- Black generator 24
- Chroma keyers 8 – 10
- Clip and sting stores 13
- Colour corrector 37
- Cross converters 14 – 16
- CWDM (Fibre Coarse Wavelength Division Multiplexing) 38
- Decoders 19 – 20
- Delays: audio 34 – 36
- Delays: video 34 – 36
- Distribution amplifiers: analogue, digital and MADI audio 44 – 46
- Distribution amplifiers: analogue, SDI, ASI, HD and 3Gb/s video 22 – 24
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- Control software 53 – 54
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- Frames 5 – 6
- Output modules 47
- Power supplies 6
- Rear modules 49 – 52
- Remote control panels 53
- SNMP control and monitoring 53
- Top boards 48

Dolby and Dolby E are trademarks of Dolby Laboratories.
So you’ve looked at the Indigo and Vision product ranges, and decided that Indigo is the one for you. Here’s what you do next...

1. First select the processing board

2. Add on any relevant options...

   - Audio input or output piggyback
   - Dolby option
   - Fibre input or output
   - More outputs with the DA6 or more GPIs with the ML-GPI8

3. Choose an appropriate rear module that gives you the inputs and outputs you need

4. Pick a suitably-sized rack frame to house your processing board – you can house up to 12 boards in our Indigo frames

5. Finally, decide how you are going to control the board...

   - Frame integrated control panel
   - Dedicated control panel for some boards
   - Board edge switches
   - Remote control panel
   - VisionWeb
   - Control software
   - GPIs
   - SNMP
The frames

Crystal Vision’s interface and keying products from the Indigo range are individual 100mm x 266mm modules that need to be housed in rack frames and require rear modules (see pages 49 – 52) to access the various inputs and outputs.

The Indigo frames are available in three sizes. The 2U frames can take up to 12 boards and the 1U frames six boards, while the desk top boxes are ideal for non-rack mounted installations and take a maximum of two boards.

Frame features include...
- Mix any boards from the Indigo range
- Optional redundant power supplies
- Sophisticated status monitoring
- Temperature controlled cooling – with extra fans and enhanced heat distribution on the CoolFlow frame
- Choice of control, including remote control from PC or SNMP system

Indigo frames

**Indigo 2AE**
2U frame with smart CPU and integrated control panel which holds any mixture of up to 12 Indigo boards. Allows Ethernet connection to a PC. Requires separate power supplies and rear modules. Fit either one PSU-160i or two PSU-160i if power redundancy is required.

**Indigo 1AE**
1U frame with smart CPU and integrated control panel which holds any mixture of up to six Indigo boards. Allows Ethernet connection to a PC. Requires separate power supply (one PSU-160i) and rear modules.

**Indigo 2SE**
CoolFlow 2U frame with smart CPU which holds any mixture of up to 12 Indigo boards. Allows Ethernet connection to a PC. Requires separate power supplies and rear modules. Fit either one PSU-160i or two PSU-160i if power redundancy is required.

**Indigo 1SE**
1U frame with smart CPU which holds any mixture of up to six Indigo boards. Allows Ethernet connection to a PC. Requires separate power supply (one PSU-160i) and rear modules.

More at [www.crystalvision.tv](http://www.crystalvision.tv)...
Indigo frames continued...

**Indigo 1AE-DP**
1U frame with power supply redundancy, smart CPU and integrated control panel which holds any mixture of up to six Indigo boards. Allows Ethernet connection to a PC. Includes two fixed PS-80i power supplies. Requires separate rear modules.

**Indigo 1SE-DP**
1U frame with power supply redundancy and smart CPU which holds any mixture of up to six Indigo boards. Allows Ethernet connection to a PC. Includes two fixed PS-80i power supplies. Requires separate rear modules.

**Indigo DT**
Desk top box with passive front panel which holds any mixture of up to two Indigo boards. Includes fixed 60W power supply. Requires separate rear modules. Rack mount kit available.

**Indigo DTSE**
Desk top box with smart CPU which holds any mixture of up to two Indigo boards. Allows Ethernet connection to a PC. Includes fixed 60W power supply. Requires separate rear modules.

---

### Power supplies

**PSU-160i**
160 Watts power supply for Indigo 2U and 1U frames. (Not used for Indigo 1-DP frames.)

**PS-80i**
Spare 80 Watts power supply for Indigo 1AE-DP and Indigo 1SE-DP frames.

**Q-Down Mini PSU**
External universal AC power supply for the Q-Down Mini minibox down converter (see page 18), with IEC input and 9-way D-Type output.
Keying has always been one of Crystal Vision’s real strengths. Whether you need to chroma key or insert graphics on to video sources, we have a product to suit your application perfectly. An integral part of our modular system, these boards fit in the standard Indigo frames and save you rack space, with Indigo’s 1U frames a popular choice for these applications. Used by broadcasters throughout the world, our acclaimed and easy-to-use Safire real-time chroma keyers are ideal for any live bluescreen or greenscreen virtual production, from weather to the most demanding virtual studio – with Safire 3 incorporating useful features such as lighting compensation, video delay and colour correction. The MultiLogo logo keyer is a powerful video and audio branding tool for adding up to three graphics to HD or SD video sources, and provides 4 GB or 8 GB of internal storage for up to 500 graphics as well as full audio processing. The affordable LKEY 3 linear keyer is designed for the simple keying of one graphic over 3Gb/s, HD or SD video streams. The unique LKEY-SQZ provides the highest quality picture squeezing and picture-in-picture effects. Ideal for providing wipes for sports or live events programming, the Clip N Key clip store allows a special clip with optional associated key signal to be played repeatedly.
### Which keyer do you need?

<table>
<thead>
<tr>
<th>Safire 3</th>
<th>Safire 3 Xpress</th>
<th>LKEY 3</th>
<th>LKEY SQZ</th>
<th>MultiLogo V132</th>
<th>MultiLogo V132 8G</th>
<th>MultiLogo V432</th>
<th>MultiLogo V432 8G</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main use</strong></td>
<td>Chroma keyer</td>
<td>Chroma keyer</td>
<td>Linear keyer</td>
<td>Square back keyer or picture-in-picture effects device</td>
<td>Logo keyer with internal storage for 250 graphics</td>
<td>Logo keyer with internal storage for 500 graphics</td>
<td>Logo keyer with internal storage for 500 graphics</td>
</tr>
<tr>
<td><strong>Input formats</strong> (50Hz and 59.94Hz where unspecified)</td>
<td>1080p23.98/24/25/ 29.97/30/50/59.94/60, 1080i23.98/24/25/ 29.97/30, 720p/50/59.94/60, 1080p/720/50/59.94/60, 2048x1080p23.98/ 24/25/29.97/30/50/51.25/44.10/42.25/10.66/6.25</td>
<td>1080p23.98/24/25/ 29.97/30/50/59.94/60, 1080i23.98/24/25/ 29.97/30, 720p/50/59.94/60, 1080p/720/50/59.94/60, 2048x1080p23.98/ 24/25/29.97/30/50/51.25/44.10/42.25/10.66/6.25</td>
<td>1080p23.98/24/25/29.97/ 30/50/59.94/60, 1080i23.98/24/25/ 29.97/30, 720p/50/59.94/60, 1080p/720/50/59.94/60, 2048x1080p23.98/ 24/25/29.97/30/50/51.25/44.10/42.25/10.66/6.25</td>
<td>1080p23.98/24/25/29.97/ 30/50/59.94/60, 1080i23.98/24/25/ 29.97/30, 720p/50/59.94/60, 1080p/720/50/59.94/60, 2048x1080p23.98/ 24/25/29.97/30/50/51.25/44.10/42.25/10.66/6.25</td>
<td>720p, 1080i, 625i, 32i</td>
<td>720p, 1080i, 625i, 32i</td>
<td>720p, 1080i, 625i, 32i</td>
</tr>
<tr>
<td><strong>Number of video inputs</strong></td>
<td>3 (Foreground, Background, External Key)</td>
<td>3 (Foreground, Background, External Key)</td>
<td>3 (Video A, Squeeze Video, Key/Video B)</td>
<td>1</td>
<td>4</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td><strong>Number of video outputs</strong></td>
<td>1 main and 1 auxiliary</td>
<td>1 main and 1 auxiliary</td>
<td>1 main and 1 auxiliary</td>
<td>1 main and 1 auxiliary</td>
<td>1 main and 1 auxiliary</td>
<td>1 main and 1 auxiliary</td>
<td>1 main and 1 auxiliary</td>
</tr>
<tr>
<td><strong>Chroma key (real-time)</strong></td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
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</tr>
<tr>
<td><strong>Linear or self key internally-stored graphics over source</strong></td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td><strong>Linear or self key graphics from external graphics machine</strong></td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
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</tr>
<tr>
<td><strong>DRAM internal graphics storage, backed up to Flash</strong></td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td><strong>Number of keyers</strong></td>
<td>2 (chroma and linear/self)</td>
<td>2 (chroma and linear/self)</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Mix between sources</strong></td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td><strong>Simple DVE with horizontal and vertical picture resizing and repositioning</strong></td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td><strong>Internal simple wipes</strong></td>
<td>Masks can be used to provide simple manual wipe</td>
<td>Masks can be used to provide simple manual wipe</td>
<td>Masks can be used to provide simple manual wipe</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td><strong>Masks</strong></td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td><strong>Foreground colour correction (RGB lift and gain)</strong></td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td><strong>Record sections of live feeds, with trimming</strong></td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td><strong>Reference timing</strong></td>
<td>From Foreground, Background or Key input or from SD Black and Burst or HD tri-level syncs, with frame synchroniser on each input</td>
<td>From Foreground, Background or Key input or from SD Black and Burst or HD tri-level syncs, with frame synchroniser on each input</td>
<td>From Foreground, Background or Key input or from SD Black and Burst or HD tri-level syncs, with frame synchroniser on each input</td>
<td>From Video A, Squeeze Video or Key/Video B input or from SD Black and Burst or HD tri-level syncs, with line synchroniser on each input</td>
<td>From input 1 or from SD Black and Burst or HD tri-level syncs, with line synchroniser on each input</td>
<td>From input 1 or from SD Black and Burst or HD tri-level syncs, with line synchroniser on each input</td>
<td>From input 1 or from SD Black and Burst or HD tri-level syncs, with line synchroniser on each input</td>
</tr>
<tr>
<td><strong>Video delay (on each input)</strong></td>
<td>Up to 10 frames additional user delay in one frame steps</td>
<td>Up to 10 frames additional user delay in one frame steps</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td><strong>Output embedded audio</strong></td>
<td>From any chosen input</td>
<td>From any chosen input</td>
<td>From any chosen input</td>
<td>From any chosen input</td>
<td>From video input or audio store</td>
<td>From video input or audio store</td>
<td>From selected video input (1 to 4), Program/Preview bus, audio store or external AES input</td>
</tr>
<tr>
<td><strong>Mix in audio clips (voiceovers/sound effects)</strong></td>
<td>From audio store</td>
<td>From audio store</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>AES outputs for audio monitoring</strong></td>
<td>From audio store or external AES input</td>
<td>From audio store or external AES input</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Perform sequence of operations using timeline control</strong></td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td><strong>GPI inputs and outputs</strong></td>
<td>6 GPI inputs</td>
<td>4 GPI inputs</td>
<td>6 GPI inputs</td>
<td>6 GPI inputs</td>
<td>4 GPI inputs and 1 GPI output – plus additional 6 GPI inputs and 8 GPI outputs if NL-GPI FX fitted</td>
<td>4 GPI inputs and 1 GPI output – plus additional 6 GPI inputs and 8 GPI outputs if NL-GPI FX fitted</td>
<td>8 GPI inputs and 8 GPI outputs</td>
</tr>
<tr>
<td><strong>Number of presets</strong></td>
<td>40</td>
<td>5</td>
<td>40</td>
<td>40</td>
<td>256, with partial presets and preset import/export</td>
<td>256, with partial presets and preset import/export</td>
<td>256, with partial presets and preset import/export</td>
</tr>
<tr>
<td><strong>Frame slots used</strong></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1 (2 FNL-GPI FX fitted)</td>
<td>1 (2 FNL-GPI FX fitted)</td>
<td>2</td>
</tr>
</tbody>
</table>

More at [www.crystalvision.tv](http://www.crystalvision.tv)...
Broadcast engineers choose the Safire 3 real-time chroma keyer for its picture quality, ease-of-use and long list of features. Working with 3Gb/s, HD and SD video sources, this top-end chroma keyer is a pleasure to operate and is ideal for any live virtual production – from studio to sport. Set up an impressive chroma key automatically using multi-point sampling, or manually adjust the picture using any of the fine-tuning tools available – including lighting compensation, noise reduction filters, shadow processing and Foreground colour correction. Includes framestore synchroniser on each input for easy system timing and up to ten frames of video delay to offset the delay caused by the graphics generators. Features linear keying capability and flexible masks which make it ideal for sports graphics applications. Relay bypass protection option (with RM73 rear module).

For full virtual studios or sports graphics...

Which rear module do you need?

<table>
<thead>
<tr>
<th>Foreground</th>
<th>Background</th>
<th>External Key</th>
<th>Black &amp; Burst ref or tri-level syncs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safire 3 RM50</td>
<td>Main</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safire 3 RM73 (Relay bypass protection)</td>
<td>Main</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For a Key to the Safire 3 product symbols please see page 10

More at www.crystalvision.tv...
Chroma keys continued...

Understanding Safire 3 and Safire 3 Xpress...

For weather or news bureau-type chroma keying...

Safire 3 Xpress

12.5 Watts

The Safire 3 Xpress real-time chroma keyer combines quality with simplicity and affordability – with control easy for even a less-technical operator. Working with 3Gb/s, HD and SD video sources, Safire 3 Xpress is ideal for single static camera applications such as news bureaus and weather, providing a higher quality of chroma keying and wider range of features than found in a studio mixer. Simple auto setup samples one representative point on the backdrop, while fine-tuning tools to manually adjust the picture include lighting compensation and shadow processing. Includes framestore synchronisation on each input for easy system timing – allowing the Background to be generated using a PC-based graphics system which cannot be timed to the camera. Features linear keying capability and flexible masks. Relay bypass protection option (with RM73 rear module).

Which rear module do you need?

For weather or news bureau-type chroma keying...

Safire 3 Xpress

12.5 Watts
Logo and linear keyers

For the straightforward keying of one graphic...

**LKEY 3**
- **12 Watts**

Affordable, feature-packed and space-saving linear keyer designed to key one graphic over 3Gb/s, HD or SD sources – with the ability to fit 12 linear keyers in 2U making it ideal for multi-channel keying applications. Includes masks with adjustable edge softness, fades and mixing between Foreground and Background. Framstore synchroniser on each input for easy system timing and up to ten frames of video delay. Relay bypass protection option (with RM73 rear module).

*Which rear module do you need?*

<table>
<thead>
<tr>
<th>Foreground</th>
<th>Background</th>
<th>Black &amp; Burst ref or tri-level syncs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main</strong></td>
<td><strong>RM50</strong></td>
<td></td>
</tr>
</tbody>
</table>

**MultiLogo V132**
- **12.5 Watts**

HD/SD three-layer logo keyer for putting three still or animated graphics on a screen at once. Includes internal multi-port video store with DRAM memory backed up to Flash, and one external video input for main programme. *MultiLogo V132* has a 4 GB store for up to 250 logos, while *MultiLogo V132 8G* has an 8 GB store for 500 logos. Easy transfer of graphics from a PC to the video store over 100MBit Ethernet. Features include numerous key processing controls, look-ahead preview, clip recording and trimming, simple text insertion, the ability to store and recall 256 partial presets, relay bypass protection and audio mixing with fading, dipping and level adjustments. Output can be locked to an analogue reference. Comes with MultiLogo Control Software which makes it easy to get logos on screen within a few minutes. Features flexible GPI control of each key level including three tallies. ‘Double decker’ module requiring two frame slots.

*Which rear module do you need?*

<table>
<thead>
<tr>
<th>HD or SD</th>
<th>100Mbit Ethernet</th>
<th>RS422</th>
<th>Black &amp; Burst ref or tri-level syncs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main</strong></td>
<td><strong>MultiLogo V132</strong></td>
<td><strong>MultiLogo V132 8G</strong></td>
<td><strong>RM52</strong></td>
</tr>
</tbody>
</table>

For powerful video and audio branding...

**MultiLogo V432**
- **16 Watts**

Choose it instead of the V132... If you want to key on dynamically changing live graphics from an external graphics machine – or you need to use the external AES input and outputs.

HD/SD three-layer logo keyer for putting three still or animated graphics on a screen at once. Includes internal multi-port video store with DRAM memory backed up to Flash, and four external video inputs for main programme and live video. *MultiLogo V432* has a 4 GB store for up to 250 logos, while *MultiLogo V432 8G* has an 8 GB store for 500 logos. Easy transfer of graphics from a PC to the video store over 100MBit Ethernet. Features include numerous key processing controls, look-ahead preview, clip recording and trimming, simple text insertion, the ability to store and recall 256 partial presets, relay bypass protection and audio mixing with fading, dipping and level adjustments. Output can be locked to an analogue reference. Includes one external AES input and two AES outputs. Comes with MultiLogo Control Software which makes it easy to get logos on screen within a few minutes. Features flexible GPI control of each key level including three tallies. ‘Double decker’ module requiring two frame slots.

*Which rear module do you need?*

<table>
<thead>
<tr>
<th>HD or SD</th>
<th>100Mbit Ethernet</th>
<th>RS422</th>
<th>Black &amp; Burst ref or tri-level syncs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main</strong></td>
<td><strong>MultiLogo V432</strong></td>
<td><strong>MultiLogo V432 8G</strong></td>
<td><strong>RM52 + RM34</strong></td>
</tr>
</tbody>
</table>

More at [www.crystalvision.tv...](http://www.crystalvision.tv...)

[Image of logo and linear keyers diagram]
Everything modular: Keying

Logo and linear keyers continued...

Understanding MultiLogo...

Squeeze back keyer

LKEY-SQZ

12.5 Watts

3G/HD/SD squeeze back keyer providing highest quality picture squeeze. Designed for any applications where the programme needs to be resized or repositioned horizontally and vertically for another layer of video to be displayed, such as squeezing end credits, squeezing a presenter to allow room for additional graphic material or picture-in-picture effects. Includes simple DVE, key processing, masks with adjustable edge softness, fades, line synchronisers and relay bypass protection. Can perform a sequence of operations using full timeline control of events.

Which rear module do you need?

One use of the LKEY-SQZ: squeezing the end credits.
Which clip store do you need?

<table>
<thead>
<tr>
<th>Clip and sting stores</th>
<th>Clip N Key V121</th>
<th>Clip N Key V121 8G</th>
<th>Clip N Key V221</th>
<th>Clip N Key V221 8G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input formats (50Hz and 59.94Hz)</td>
<td>720p, 1080i, 625i, 525i</td>
<td>720p, 1080i, 625i, 525i</td>
<td>720p, 1080i, 625i, 525i</td>
<td>720p, 1080i, 625i, 525i</td>
</tr>
<tr>
<td>Number of external video inputs</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Number of video outputs</td>
<td>Clip and either key or second clip</td>
<td>Clip and either key or second clip</td>
<td>Clip and either key or second clip</td>
<td>Clip and either key or second clip</td>
</tr>
<tr>
<td>Size of internal store (DRAM, backed up to Flash)</td>
<td>4 GB</td>
<td>8 GB</td>
<td>4 GB</td>
<td>8 GB</td>
</tr>
<tr>
<td>Length of HD video stored (no key signal)</td>
<td>30 seconds (50Hz); 25 seconds (59.94Hz)</td>
<td>60 seconds (50Hz); 50 seconds (59.94Hz)</td>
<td>30 seconds (50Hz); 25 seconds (59.94Hz)</td>
<td>60 seconds (50Hz); 50 seconds (59.94Hz)</td>
</tr>
<tr>
<td>Length of HD video stored with key signal</td>
<td>15 seconds (50Hz); 12 seconds (59.94Hz)</td>
<td>30 seconds (50Hz); 25 seconds (59.94Hz)</td>
<td>15 seconds (50Hz); 12 seconds (59.94Hz)</td>
<td>30 seconds (50Hz); 25 seconds (59.94Hz)</td>
</tr>
<tr>
<td>Length of SD video stored (no key signal)</td>
<td>150 seconds</td>
<td>300 seconds</td>
<td>150 seconds</td>
<td>300 seconds</td>
</tr>
<tr>
<td>Length of SD video stored with key signal</td>
<td>75 seconds</td>
<td>150 seconds</td>
<td>75 seconds</td>
<td>150 seconds</td>
</tr>
<tr>
<td>Maximum number of clips stored</td>
<td>250</td>
<td>500</td>
<td>250</td>
<td>500</td>
</tr>
<tr>
<td>Grab fill and separate key signal at same time for synchronised movement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Record sections of live feeds, with trimming</td>
<td>Fill or Key</td>
<td>Fill or Key</td>
<td>Fill or Key or Both</td>
<td>Fill or Key or Both</td>
</tr>
<tr>
<td>Simple text creation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference timing from input 1 or from SD Black &amp; Burst or HD tri-level syncs, with one-line TBC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relay bypass protection</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Play out embedded audio</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of presets</td>
<td>256 (16 recallable by GPI)</td>
<td>256 (16 recallable by GPI)</td>
<td>256 (256 recallable by GPI)</td>
<td>256 (256 recallable by GPI)</td>
</tr>
<tr>
<td>GPI inputs</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Frame slots used</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Clip N Key V221 8G

HD/SD clip and sting store for adding extra video sources to a mixer and enhancing transitions. Features one video input for live video. Clip N Key V121’s 4 GB video store holds 30 seconds of moving HD video (15 seconds with key signal) or 150 seconds of moving SD video (75 seconds with key signal). Clip N Key V121 8G’s 8 GB video store holds 60 seconds of moving HD video (30 seconds with key signal) or 300 seconds of moving SD video (150 seconds with key signal). Clips can have accompanying audio and are created either by recording from the video input (with easy trimming) or are downloaded to the board over 100MBit Ethernet as a graphics file. Includes relay bypass protection and the ability to lock the video output to an analogue reference. Comes with special version of MultiLogo Control Software. Specific driver for Clip N Key provided on the FOR-A HVS-350HS video mixer, allowing specific clips to be triggered using the mixer control panel.

Which rear module do you need?

Choose it instead of the V121… If you want to grab a fill and separate key signal at the same time so that any movement is in synchronisation on the two channels.

HD/SD clip and sting store for adding extra video sources to a mixer and enhancing transitions. Features two video inputs for live video. Clip N Key V221’s 4 GB video store holds 30 seconds of moving HD video (15 seconds with key signal) or 150 seconds of moving SD video (75 seconds with key signal). Clip N Key V221 8G’s 8 GB video store holds 60 seconds of moving HD video (30 seconds with key signal) or 300 seconds of moving SD video (150 seconds with key signal). Clips can have accompanying audio and are created either by recording from the video input (with easy trimming) or are downloaded to the board over 100MBit Ethernet as a graphics file. Includes relay bypass protection and the ability to lock the video output to an analogue reference. Comes with special version of MultiLogo Control Software. ‘Double decker’ module requiring two frame slots. Specific driver for Clip N Key provided on the FOR-A HVS-350HS video mixer, allowing specific clips to be triggered using the mixer control panel.

More at [www.crystalvision.tv](http://www.crystalvision.tv)...
## Which up and down converter do you need?

|------------|------------|---------------|---------------|---------------|---------------|-----------|-----------|---------------|---------------|---------------------|
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Up and down conversion

Working with 3Gb/s, HD and SD sources, our up and down converters will give you the best quality at the best price – with extra features for that really tidy system design. No wonder, then, that they are our top-selling products. The up/down/cross converters combine the remarkable picture quality of motion adaptive video de-interlacing with four group embedded audio handling, aspect ratio conversion, signal timing, integrated fibre connectivity and AFD data insertion and reading – and can even create constant and co-timed HD and SD copies of a signal simultaneously. The Q-Down short-delay down converters offer a unique level of image quality in their price range, combining their exceptional broadcast down conversion with distribution, delay, aspect ratio conversion, on-board fibre and four group audio options – with Q-Down even available in a minibox for those with no spare rack space. These are products that undergo in-depth evaluations – and win.

Up/down/cross converters

The up/down/cross converters with the picture quality that broadcasters standardise on...

<table>
<thead>
<tr>
<th>Model</th>
<th>Power Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up-Down 3G</td>
<td>11.9 Watts</td>
</tr>
<tr>
<td>Up-Down-A 3G</td>
<td>11.9 Watts</td>
</tr>
<tr>
<td>Up-Down-AFD 3G</td>
<td>11.9 Watts</td>
</tr>
<tr>
<td>Up-Down-AT 3G</td>
<td>11.9 Watts</td>
</tr>
<tr>
<td>Up-Down-ATX 3G</td>
<td>11.9 Watts</td>
</tr>
</tbody>
</table>

Combined up/down/cross converter which works with 3Gb/s, HD and SD, can perform two different conversions simultaneously and provides the picture quality that broadcasters standardise on. Up conversions are 3D to 720p, 1080i or 1080p. Down conversions are 1080p, 1080i or 720p to 3D. Cross conversions are 720p to 1080i or 1080p, 1080i to 720p or 1080p, and 1080p to 1080i or 720p. All conversions are available at both 50Hz and 59.94Hz. Outstanding performance with motion adaptive video de-interlacing, Crystal Vision’s proprietary down conversion, detail enhancement and noise reduction. Easy to output HD and SD at the same time with co-timed dual outputs which remain constant in format even if the input changes. Features aspect ratio converter including customised picture size, position and cropping, variable video delay, signal probe and video proc-amp, and can pass Ancillary Timecode from the input to the output. Provides six input loop-throughs if DA6 top board fitted (see page 48). Can include integrated fibre connectivity by fitting either the FIP fibre input option or the FOP fibre output option (see page 30).

Additional features on all versions except Up-Down 3G... Can handle four groups of embedded audio and includes silence alarms.

Additional features on Up-Down-AFD 3G, Up-Down-AT 3G and Up-Down-ATX 3G... Can use SMPTE 2016 AFD data, WSS or Video index in video input to automatically select aspect ratio, and can insert it into the video output for downstream equipment.

Other features you’ll get on Up-Down-AT 3G and Up-Down-ATX 3G... Audio routing by stereo channel, conversion of timecode between HD Ancillary Timecode and SD DVITC, and two features for when your input and output formats are identical: HD to HD aspect ratio conversions and an HD video proc-amp.

Features only available on Up-Down-ATX 3G... Transport of teletext, subtitles and closed captions across different definitions.

Rear modules on next page...

Understanding Up-Down-AFD 3G...

![Diagram of Up-Down-AFD 3G](image)

More at www.crystalvision.tv...
Up/down/cross converters continued...

Which rear module do you need?

**Up-Down-AS 3G**
- 11.9 Watts
- Synchronising up/down/cross converter which works with 3Gb/s, HD and SD and up to four groups of embedded audio and includes two downstream synchronisers which keep the output valid even when the input standard changes. Can perform two different conversions simultaneously and provides the picture quality that broadcasters standardise on. Up conversions are SD to 720p, 1080i or 1080p. Down conversions are 1080p, 1080i or 720p to SD. Cross conversions are 720p to 1080i or 1080p, 1080p to 720p or 1080p and 1080p to 1080i or 720p. All conversions available at both 50Hz and 59.94Hz. Outstanding performance with motion adaptive video de-interlacing, Crystal Vision’s proprietary down conversion, detail enhancement and noise reduction. Easy to output HD and SD at the same time with co-timed dual outputs which remain constant in format even if the input changes. Features horizontal and vertical timing adjustments, cross-locking, audio resampling and Dolby E alignment.
- Features aspect ratio converter including customised picture size, position and timing adjustments, cross-locking, audio resampling and Dolby E alignment.
- Features aspect ratio converter including customised picture size, position and timing adjustments, cross-locking, audio resampling and Dolby E alignment.
- Provides six input loop-throughs if DA6 top board fitted (see page 48). Can include integrated fibre connectivity by fitting either the FIP fibre input option or the FOP fibre output option (see page 38).
- Additional features on all versions except Up-Down-AS 3G... Can use SMPTE 2016 AFD data, WSS or Video index in video input to automatically select aspect ratio, and can insert it into the video output for downstream equipment.

**Up-Down-AFDS 3G**
- 11.9 Watts
- Other features you’ll get on Up-Down-ATS 3G and Up-Down-ATXS 3G... Audio routing by stereo channel, conversion of timecode between HD Ancillary Timecode and SD DVITC, and two features for when your input and output formats are identical: HD to HD aspect ratio conversions and an HD video proc-amp, and can pass Ancillary Timecode from the input to the output. Provides six input loop-throughs if DA6 top board fitted (see page 48). Can include integrated fibre connectivity by fitting either the FIP fibre input option or the FOP fibre output option (see page 38).

**Up-Down-ATS 3G**
- 11.9 Watts
- Other features you’ll get on Up-Down-ATS 3G and Up-Down-ATXS 3G... Audio routing by stereo channel, conversion of timecode between HD Ancillary Timecode and SD DVITC, and two features for when your input and output formats are identical: HD to HD aspect ratio conversions and an HD video proc-amp, and can pass Ancillary Timecode from the input to the output. Provides six input loop-throughs if DA6 top board fitted (see page 48). Can include integrated fibre connectivity by fitting either the FIP fibre input option or the FOP fibre output option (see page 38).

**Up-Down-ATXS 3G**
- 11.9 Watts
- Other features you’ll get on Up-Down-ATS 3G and Up-Down-ATXS 3G... Audio routing by stereo channel, conversion of timecode between HD Ancillary Timecode and SD DVITC, and two features for when your input and output formats are identical: HD to HD aspect ratio conversions and an HD video proc-amp, and can pass Ancillary Timecode from the input to the output. Provides six input loop-throughs if DA6 top board fitted (see page 48). Can include integrated fibre connectivity by fitting either the FIP fibre input option or the FOP fibre output option (see page 38).

Synchronising up/down/cross converters

1. **Up-Down-AS 3G**
   - 11.9 Watts
   - Synchronising up/down/cross converter which works with 3Gb/s, HD and SD and up to four groups of embedded audio and includes two downstream synchronisers which keep the output valid even when the input standard changes. Can perform two different conversions simultaneously and provides the picture quality that broadcasters standardise on. Up conversions are SD to 720p, 1080i or 1080p. Down conversions are 1080p, 1080i or 720p to SD. Cross conversions are 720p to 1080i or 1080p, 1080p to 720p or 1080p, and 1080p to 1080i or 720p. All conversions available at both 50Hz and 59.94Hz. Outstanding performance with motion adaptive video de-interlacing, Crystal Vision’s proprietary down conversion, detail enhancement and noise reduction. Easy to output HD and SD at the same time with co-timed dual outputs which remain constant in format even if the input changes. Features horizontal and vertical timing adjustments, cross-locking, audio resampling and Dolby E alignment.
   - Features aspect ratio converter including customised picture size, position and timing adjustments, cross-locking, audio resampling and Dolby E alignment.
   - Features aspect ratio converter including customised picture size, position and timing adjustments, cross-locking, audio resampling and Dolby E alignment.
   - Provides six input loop-throughs if DA6 top board fitted (see page 48). Can include integrated fibre connectivity by fitting either the FIP fibre input option or the FOP fibre output option (see page 38).

2. **Up-Down-AFDS 3G**
   - 11.9 Watts
   - Other features you’ll get on Up-Down-ATS 3G and Up-Down-ATXS 3G... Audio routing by stereo channel, conversion of timecode between HD Ancillary Timecode and SD DVITC, and two features for when your input and output formats are identical: HD to HD aspect ratio conversions and an HD video proc-amp, and can pass Ancillary Timecode from the input to the output. Provides six input loop-throughs if DA6 top board fitted (see page 48). Can include integrated fibre connectivity by fitting either the FIP fibre input option or the FOP fibre output option (see page 38).

3. **Up-Down-ATS 3G**
   - 11.9 Watts
   - Other features you’ll get on Up-Down-ATS 3G and Up-Down-ATXS 3G... Audio routing by stereo channel, conversion of timecode between HD Ancillary Timecode and SD DVITC, and two features for when your input and output formats are identical: HD to HD aspect ratio conversions and an HD video proc-amp, and can pass Ancillary Timecode from the input to the output. Provides six input loop-throughs if DA6 top board fitted (see page 48). Can include integrated fibre connectivity by fitting either the FIP fibre input option or the FOP fibre output option (see page 38).

4. **Up-Down-ATXS 3G**
   - 11.9 Watts
   - Other features you’ll get on Up-Down-ATS 3G and Up-Down-ATXS 3G... Audio routing by stereo channel, conversion of timecode between HD Ancillary Timecode and SD DVITC, and two features for when your input and output formats are identical: HD to HD aspect ratio conversions and an HD video proc-amp, and can pass Ancillary Timecode from the input to the output. Provides six input loop-throughs if DA6 top board fitted (see page 48). Can include integrated fibre connectivity by fitting either the FIP fibre input option or the FOP fibre output option (see page 38).

Which rear module do you need?

More at www.crystalvision.tv...
Everything modular: Video interface

**Down converters**

**Q-Down123**  **10 Watts**

Broadcast down converter and distribution amplifier with a short processing delay which works with HD and SD. Unique level of image quality in price range, with sophisticated two dimensional filtering which avoids aliasing while retaining picture sharpness. Ideal for video-only applications in mixed HD and SD environments. Gives up to two reclocked loop-throughs of the HD or SD input, along with three SDI / Composite / YG and digital. Includes three fixed delays and aspect ratio converter with Anamorphic, Letterbox and Full Screen centre cut conversions.

Use Q-Down-AG 3G instead… If you’re working in an embedded audio environment or with 3Gb/s sources, or you require features such as a signal probe, variable video delay, integrated fibre or AFD functionality.

Which rear module do you need?

<table>
<thead>
<tr>
<th>HD or SD</th>
<th>SDI / Composite / YG</th>
<th>HD or SD loop</th>
<th>YG</th>
<th>HD or SD loop x 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q-Down123</td>
<td>RM34 (Single height)</td>
<td>SDI / Composite / YG</td>
<td>SDI / Composite / U/B</td>
<td>SDI / Composite / V/R/C</td>
</tr>
<tr>
<td>Q-Down183</td>
<td>RM45 (Single height)</td>
<td>SDI / Composite / YG</td>
<td>SDI / Composite / U/B</td>
<td>SDI / Composite / V/R/C</td>
</tr>
</tbody>
</table>

**Q-Down183**  **12.5 Watts**

Broadcast down converter and distribution amplifier with a short processing delay which works with HD and SD. Unique level of image quality in price range, with sophisticated two dimensional filtering which avoids aliasing while retaining picture sharpness. Ideal for video-only applications in mixed HD and SD environments. Gives up to eight reclocked loop-throughs of the HD or SD input, along with three SDI / Composite / YG and digital. Includes three fixed delays and aspect ratio converter with Anamorphic, Letterbox and Full Screen centre cut conversions.

Use Q-Down-AG 3G with DA6 top board instead… If you’re working in an embedded audio environment or with 3Gb/s sources, or you require features such as a signal probe, variable video delay, integrated fibre or AFD functionality.

Which rear module do you need?

<table>
<thead>
<tr>
<th>HD or SD</th>
<th>SDI / Composite / YG</th>
<th>HD or SD loop</th>
<th>YG</th>
<th>HD or SD loop x 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q-Down183</td>
<td>RM64 &amp; RM34 (Double height)</td>
<td>SDI / Composite / YG</td>
<td>SDI / Composite / U/B</td>
<td>SDI / Composite / V/R/C</td>
</tr>
<tr>
<td>Q-Down183</td>
<td>RM45 &amp; RM34 (Double height)</td>
<td>SDI / Composite / YG</td>
<td>SDI / Composite / U/B</td>
<td>SDI / Composite / V/R/C</td>
</tr>
</tbody>
</table>

**Q-Down-ATG 3G**  **11 Watts**

Broadcast down converter and distribution amplifier with a short processing delay which works with 3Gb/s, HD and SD. Can handle four groups of embedded audio. Unique level of image quality in price range, with sophisticated two dimensional filtering which avoids aliasing while retaining picture sharpness. With a 3Gb/s input the three video outputs can be configured as either mixtures of HD digital and analogue (YUV and RGB), or as mixtures of SD digital and analogue (composite, Y/C, YUV and RGB). With an HD or SD input, the three video outputs can be configured as mixtures of SD digital and analogue (composite, Y/C, YUV and RGB). Also gives up to two reclocked input loop-throughs, or up to eight loop-throughs if a DA6 top board is fitted (see page 48). Features aspect ratio converter including customised picture size, position and cropping. Can use SMPTE 2016 AFD data in video input to automatically select aspect ratio and can insert AFD and WSS for downstream equipment. Includes three fixed delays, variable video delay of up to one frame, video proc-amp and signal reporting. Can include integrated fibre connectivity by fitting either the FIP fibre input option or the FOP fibre output option (see page 38).

Additional features only on Q-Down-ATG 3G… Transport of timecode and closed captions across different definitions.

Which rear module do you need?

<table>
<thead>
<tr>
<th>HD or SD</th>
<th>HD / SDI / Composite / YG</th>
<th>HD / SDI / Composite / U/B</th>
<th>HD / SDI / Composite / V/R/C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q-Down-ATG 3G</td>
<td>RM41 + RM34 (Double height)</td>
<td>HD / SDI / Composite / YG</td>
<td>HD / SDI / Composite / U/B</td>
</tr>
<tr>
<td>Q-Down-ATG 3G</td>
<td>RM57 (Fibre in or out)</td>
<td>Optical out (HD or SDI)</td>
<td>HD / SDI / Composite / YG</td>
</tr>
</tbody>
</table>

NB. Choose between fibre in or fibre out by selecting FIP or FOP fibre option

More at [www.crystalvision.tv...](http://www.crystalvision.tv...)
Minibox broadcast down converter with a short processing delay which works with HD and SD. Ideal for attaching to the back of an SD monitor. Unique level of image quality in price range, with sophisticated two dimensional filtering which avoids aliasing while retaining picture sharpness. Gives one reclocked loop-through of the HD or SD input, one dedicated SDI output and three Standard Definition outputs individually selectable between analogue (composite, Y/C, YUV and RGB) and digital. Includes three fixed delays and aspect ratio converter with Anamorphic, Letterbox and Full Screen centre cut conversions. Used with external power supply: Q-Down Mini PSU (see page 6).

Use it instead of a modular Q-Down... If you need to provide down converted feeds for SD monitors and you’re short of rack space.
Video conversion

Crystal Vision’s A to D and D to A converters continue to be popular with those working in Standard Definition environments. The decoders are perfect for bringing sources generated by cameras, tape machines, DVD players and graphics generators into a digital environment and can work with the full range of analogue signals (composite, Y/C, YUV and RGB) and cope with signals of varying qualities. The encoders can produce a flexible configuration of analogue video outputs – with mixtures of composite, Y/C, YUV and RGB available, along with SDI distribution.

<table>
<thead>
<tr>
<th></th>
<th>ADDEC-210</th>
<th>ADDEC-310</th>
<th>EMDEC-200</th>
<th>ALLDAC</th>
<th>MON210</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversion</td>
<td>Analogue to digital</td>
<td>Analogue to digital</td>
<td>Analogue to digital</td>
<td>Digital to analogue</td>
<td>Digital to analogue</td>
</tr>
<tr>
<td>Performance</td>
<td>12 bit broadcast</td>
<td>12 bit broadcast</td>
<td>12 bit broadcast</td>
<td>12 bit broadcast</td>
<td>8 bit monitoring</td>
</tr>
<tr>
<td>Input formats</td>
<td>PAL, NTSC, Y/C, YUV and RGB</td>
<td>PAL, NTSC, Y/C, YUV and RGB</td>
<td>PAL, NTSC, Y/C</td>
<td>SDI</td>
<td>SDI</td>
</tr>
<tr>
<td>Output formats</td>
<td>SDI</td>
<td>SDI</td>
<td>SDI</td>
<td>PAL, NTSC, Y/C, YUV, RGB, SDI</td>
<td>PAL, NTSC, Y/C</td>
</tr>
<tr>
<td>Maximum outputs</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>8 (in flexible combinations)</td>
<td>5 composite, or 2 Y/C pairs with 1 composite</td>
</tr>
<tr>
<td>Distribution amplifier</td>
<td></td>
<td></td>
<td></td>
<td>(max 2 loop-throughs)</td>
<td></td>
</tr>
<tr>
<td>Single or dual channel</td>
<td>Single</td>
<td>Single</td>
<td>Single</td>
<td>Single</td>
<td>Dual</td>
</tr>
<tr>
<td>Analogue reference</td>
<td>(with loop)</td>
<td>(with loop)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Framestore synchroniser</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tracking audio delay</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Embed analogue audio</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test patterns</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Remote control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full board edge control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

More at www.crystalvision.tv...
ADDEC-210  6 Watts
ADDEC-310  6.5 Watts

12 bit broadcast decoding converter designed to convert different analogue signals (PAL/NTSC, Y/C, YUV and RGB) to SDI. Excellent output quality with data sampled at 54MBit, five line comb and 12bit A to D. Suitable for all sources, from broadcast to VHS – copes with both stable and non-stable signals. Includes a framestore synchroniser, adjustment of output timing and gain and level adjustments.

Additional features on ADDEC-310… The ADDEC with the most features: ideal for people who like board edge control as all adjustments are available from here as well as ten character display.

Which rear module do you need?

**EMDEC-200**

12 bit composite PAL/NTSC or Y/C to SDI broadcast embedding decoder. EMDEC-200 offers the functions of three products on one board, saving rack space and making systems 25% cheaper. It replaces a decoder with synchroniser, tracking audio delay and embedder, and is ideal for anyone who needs to bring analogue video into an embedded environment. Copes with both stable and non-stable signals. Embed analogue audio by fitting one audio piggyback module (see page 47).

**Which rear module do you need?**
Digital to analogue converters and encoders

**ALLDAC**  
12 bit broadcast encoding converter with distribution amplifier. Converts SDI into flexible combinations of analogue and digital, with outputs configured as a mixture of composite, Y/C, YUV, RGB and SDI distribution. Ideal for all monitoring applications and for broadcast applications which do not require a TBC or the ability to time the sub-carrier reference.

*Which rear module do you need?*

- **SDI**
  - SDI / Composite / Y / G / YCY-M2
  - SDI / Composite / U / B / YCC-M2
  - Composite / V / R / YCC-M1
  - Composite / YCY-M1

- **ALLDAC RM01**  
  - Single height

- **ALLDAC RM02**  
  - Single height

- **ALLDAC RM18**  
  - Double height

**MON210**  
8 bit dual channel SDI to composite PAL/NTSC or Y/C monitoring encoder. Provides maximum of five composite (or two Y/C pairs and one composite) outputs per channel. Suitable for driving picture monitors, waveform monitors and vector scopes. With up to 24 encoders in 2U, ideal for multi-channel monitoring requirements where space and cost are at a premium.

*Which rear module do you need?*

- **SDI**
  - SDI / Composite
  - C / Composite

- **MON210 1/3 RM01**  
  - Single height

- **MON210 1/3 RM02**  
  - Single height

- **MON210 RM18**  
  - Double height

More at [www.crystalvision.tv](http://www.crystalvision.tv)...
Video distribution

Crystal Vision provides distribution amplifiers for the full range of video signals – whether you need to distribute analogue video, SDI, DVB-ASI, HD or 3Gb/s. Some can distribute a variety of different signals – perfect for future-proofing your installation. You can select the number of outputs you need (up to eleven), and choose from many different options including dual or single channel, reclocking or non-reclocking, signal monitoring and reporting and relay bypass protection. If you need to do more than just distribute your signals, many of Crystal Vision’s other interface products include a distribution amplifier in their features list. You can distribute your SDI using the ALLDAC digital to analogue converter (see page 21), while up to eight input loop-throughs are available if you use one of our up and down converters (see pages 15 – 18).

Which video distribution amplifier do you need?

<table>
<thead>
<tr>
<th>Distributions</th>
<th>VDA110M HD</th>
<th>VDA110R HD</th>
<th>VDA101M HD</th>
<th>3GDA105R</th>
<th>3GDA105C</th>
<th>3GDA111R</th>
<th>3GDA111C</th>
<th>3GDA411W</th>
<th>3GDA406R</th>
<th>3GDA410R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distributes analogue video (SD and HD)</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distributes SDI</td>
<td></td>
<td></td>
<td></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Distributes DVB-ASI</td>
<td></td>
<td></td>
<td></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Distributes HD (720p and 1080i)</td>
<td></td>
<td></td>
<td></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Distributes 3Gb/s (1080p)</td>
<td></td>
<td></td>
<td></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Maximum number of outputs</td>
<td>11</td>
<td>11</td>
<td>5 per channel (or 10 if configured as single channel)</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>2 per channel</td>
</tr>
<tr>
<td>Loop-throughs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reclocking</td>
<td></td>
<td></td>
<td></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Non-reclocking</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Single or dual channel</td>
<td>Single</td>
<td>Single</td>
<td>Dual</td>
<td>Single</td>
<td>Single</td>
<td>Single</td>
<td>Single</td>
<td>Single</td>
<td>Dual</td>
<td>Dual</td>
</tr>
<tr>
<td>Adjustable gain (+/-3dB)</td>
<td></td>
<td></td>
<td></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Adjustable equalisation</td>
<td></td>
<td></td>
<td></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Adjustable clamp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auto adjusts slew rate</td>
<td></td>
<td></td>
<td></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Signal reporting</td>
<td></td>
<td></td>
<td></td>
<td>(input standard, sync over-amplitude, dark video input, white-clip video input)</td>
<td>(input present, signal type)</td>
<td>(input present, signal type)</td>
<td>(input present and signal type for each channel)</td>
<td>(input present and signal type for each channel)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relay bypass protection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Frame slots used</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remote control and monitoring</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Everything modular: Video interface

Analogue video distribution amplifiers (SDI, ASI, HD and 3Gb/s)

**VDA110M HD**
- 1.4 Watts

**VDA110R HD**
- 4 Watts

Broadcast analogue video distribution amplifier. Ideal for distributing SD Black and Burst or HD tri-level syncs analogue reference, or for the distribution of SD or HD analogue video. Can be used with differential or non-differential inputs. Used with four different rear modules for flexible output configurations. Maximum of ten outputs and one loop-through or eleven outputs. Adjustable gain and equalisation.

**VDA210M HD**
- 2 Watts

Dual broadcast analogue video distribution amplifier. Ideal for distributing SD Black and Burst or HD tri-level syncs analogue reference, or for the distribution of SD or HD analogue video. Can be used with differential or non-differential inputs or a mixture of the two. Used with four different rear modules for flexible output configurations. Each channel has a maximum of four outputs and one loop-through or five outputs. Adjustable gain and equalisation. Manual control.

Which rear module do you need?

- **Analogue video (not differential)**
  - Single height
  - Analogue video x 5
  - Analogue video (differential)
  - Analogue video loop (RM)
  - Analogue video x 10
  - Analogue video (not differential)

- **Analogue video (differential)**
  - Single height
  - Analogue video x 5
  - Analogue video (differential)
  - Analogue video loop (RM)
  - Analogue video x 10
  - Analogue video (not differential)

Digital video distribution amplifiers (SDI, ASI, HD and 3Gb/s)

**3GDA105R**
- 5.6 Watts

**3GDA105C**
- 3.2 Watts

Redlocking distribution amplifier for 3Gb/s, HD and SD sources which gives five reclocked outputs. All outputs are DVB-ASI compatible. Includes auto detection of input. Relay bypass protection option (with RM67 rear module).

Additional features on the 3GDA105R... Signal reporting, with remote monitoring of input present and signal type using VisionWeb Control web browser software or SNMP.

Which rear module do you need?

- **3G or HD or SD**
  - 3GDA105R (Relay bypass protection)
    - Single height

**3GDA105N**
- 2.8 Watts

Non-reclocking distribution amplifier for 3Gb/s, HD and SD sources which gives five reclocked outputs. All outputs are DVB-ASI compatible. Relay bypass protection option (with RM67 rear module).

Which rear module do you need?

- **3G or HD or SD**
  - 3GDA105N (Relay bypass protection)
    - Single height

**3GDA111R**
- 8 Watts

**3GDA111C**
- 5.6 Watts

Redlocking distribution amplifier for 3Gb/s, HD and SD sources which gives eleven reclocked outputs. All outputs are DVB-ASI compatible. Includes auto detection of input. ‘Double decker’ PCB which fits in two frame slots. Relay bypass protection option (with RM67 + RM34 rear module).

Additional features on the 3GDA111R... Signal reporting, with remote monitoring of input present and signal type using VisionWeb Control web browser software or SNMP.

Which rear module do you need?

- **3G or HD or SD**
  - 3GDA111R (Relay bypass protection)
    - Double height

More at [www.crystalvision.tv...](http://www.crystalvision.tv...)

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Digital video distribution amplifiers (SDI, ASI, HD and 3Gb/s) continued...

3GDA111N
5.2 Watts

Non-locking distribution amplifier for 3Gb/s, HD and SD sources which gives eleven non-relocked outputs. ‘Double decker’ PCB which fits in two frame slots. Relay bypass protection option (with RM67 + RM34 rear module).

Which rear module do you need?

3GDA204R
3.5 Watts

Dual channel reclocking distribution amplifier for 3Gb/s, HD and SD sources which gives five reclocked outputs per channel. All outputs are DVB-ASI compatible. Auto detection of input. Includes signal reporting, with remote monitoring of input present and signal type using VisionWeb Control software or SNMP. Relay bypass protection option to protect both inputs (with RM76 rear module).

Which rear module do you need?

3GDA210R
4.5 Watts

Dual channel reclocking distribution amplifier for 3Gb/s, HD and SD sources which gives five reclocked outputs per channel. All outputs are DVB-ASI compatible. Auto detection of input. Includes signal reporting, with remote monitoring of input present and signal type using VisionWeb Control software or SNMP. ‘Double decker’ PCB which fits in two frame slots. Relay bypass protection option to protect both inputs (with RM76 + RM34 rear module).

Which rear module do you need?

Reference generation

The REFGEN black generator is designed for those who don’t have a master reference or who want to create offset timing references from the station master.

By producing up to four analogue and four digital reference signals simultaneously, REFGEN has the capability to send eight reference signals to a wide variety of broadcast equipment.

Black generator

Analogue and digital black generator, ideal for those without a master reference. Provides both analogue and digital reference signals that are either free running or timed to an analogue input.

Which rear module do you need?
Aspect ratio conversion

The ARC-20MC aspect ratio converter has all the features that make it suitable for every application – with superb picture quality, customised conversions and time-saving presets, full AFD functionality for easy automation and the ability to change the aspect ratio live on air without picture disruption. Our up and down converters (see pages 15 – 18) include flexible aspect ratio conversion when converting between different definitions and can even be used as an SD to SD or HD to HD aspect ratio converter – ideal for those situations when the original source was up converted using the wrong aspect ratio. Plus we’ve got a range of products (including synchronisers and up and down converters) that allow automatic selection of the appropriate aspect ratio thanks to AFD insertion and reading.

Which rear module do you need?

More at www.crystalvision.tv...
### Which synchroniser do you need?

<table>
<thead>
<tr>
<th></th>
<th>SYN103</th>
<th>SYN 3G</th>
<th>SYN-A 3G</th>
<th>SYNNER 310</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input formats</strong></td>
<td>625i, 525i</td>
<td>1080p, 720p, 1080i, 625i, 525i</td>
<td>1080p, 720p, 1080i, 625i, 525i</td>
<td>1080p, 1080PsF24, 1080PsF23.98, 720p, 1080i, 625i, 525i</td>
</tr>
<tr>
<td><strong>Use as synchroniser or delay line</strong></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Minimum video delay</strong></td>
<td>220us</td>
<td>220us</td>
<td>220us (resampling and Dolby alignment off); 3ms (resampling on); 0.5 frames (Dolby alignment on)</td>
<td>1 line</td>
</tr>
<tr>
<td><strong>Full vertical and horizontal adjustment up to one frame</strong></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Additional video delays</strong></td>
<td>1, 2 or 3 frames additional user delay</td>
<td>1, 2 or 3 frames additional user delay</td>
<td>1, 2 or 3 frames additional user delay</td>
<td>Up to 10 frames additional user delay in one frame steps; 0.5 frames for Dolby E align</td>
</tr>
<tr>
<td><strong>Number of video outputs (max)</strong></td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td><strong>Analogue reference (SD Black &amp; Burst or HD tri-level syncs)</strong></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>(loop with RM70)</td>
</tr>
<tr>
<td><strong>Manual/automatic freeze</strong></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Use with embedded audio sources</strong></td>
<td>If input/output frames rate locked together</td>
<td>If input/output frames rate locked together</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Number of audio groups processed</strong></td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><strong>Embed/de-embed digital audio</strong></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Embed/de-embed analogue audio</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Number of external audio I/O channels available for embedding/de-embedding</strong></td>
<td>AES: 8 stereo pairs (4 groups) Analogical audio: 8 mono (2 groups)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Uses piggybacks</strong></td>
<td></td>
<td></td>
<td></td>
<td>2 (DIOP4, 3G-AIP2, 3G-AOP2)</td>
</tr>
<tr>
<td><strong>Audio routing</strong></td>
<td></td>
<td>8 x 8 stereo router</td>
<td></td>
<td>Mono routers auto configured according to options fitted</td>
</tr>
<tr>
<td><strong>Synchronise mix of Dolby E and AES</strong></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Dolby E alignment</strong></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Can decode Dolby E</strong></td>
<td></td>
<td></td>
<td></td>
<td>●</td>
</tr>
<tr>
<td><strong>SMPTE 2020 embedding/de-embedding</strong></td>
<td></td>
<td></td>
<td></td>
<td>●</td>
</tr>
<tr>
<td><strong>Tracking audio delay</strong></td>
<td></td>
<td></td>
<td></td>
<td>●</td>
</tr>
<tr>
<td><strong>Audio delays (on top of tracking)</strong></td>
<td>Linear AES: 120ms; Dolby E: 0-3 frames</td>
<td>Linear AES: 1 to 10 frames fixed delay, 400ms; Dolby E: 0-1 frame, 40 samples</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Audio resampling</strong></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Audio processing (gain, stereo to mono)</strong></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Video proc-amp (RGB and YUV lift and gain)</strong></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>AFD insertion</strong></td>
<td></td>
<td></td>
<td></td>
<td>●</td>
</tr>
<tr>
<td><strong>Relay bypass protection</strong></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Fibre I/O</strong></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Min frame slots used (depends on rear module)</strong></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1 (2 if Dolby option fitted)</td>
</tr>
</tbody>
</table>
**Synchronisation**

Whether you need to synchronise incoming video signals not locked to your local reference or compensate for timing delays within your video system, Crystal Vision’s extensive range of synchronisers will be perfect for the task. Some of the boards are designed for sources that contain embedded audio, others are perfect for video-only sources. Between them these feature-packed boards include flexible timing adjustments, freeze functionality, cross-locking, tracking audio delay, AFD insertion, audio routing, audio and video processing, integrated fibre connectivity and unique features for dealing with Dolby E. The multi-functional SYNENER 310 additionally includes the embedding and de-embedding of up to four groups of external audio, and allows a Dolby option top board to be fitted for the easy decoding of Dolby E signals.

And that’s not the end to our synchronising. Our Safe Switch 3G 2 x 2 routing switch (see page 31) uses a full framestore synchroniser on each input to guarantee a clean switch. Our synchronising up/down/cross converters (page 16) use two downstream synchronisers to keep the two outputs valid at all times. Our Safire 3 and Safire 3 Xpress chroma keyers (pages 9 and 10) and UKEY 3 linear keyer (page 10) all include a synchroniser on each input for easy system timing, while our video delays (pages 35 and 36) can delay and synchronise at the same time. Even our analogue to digital converters (page 20) include a synchroniser, allowing untimed inputs to be timed to the local reference.

---

**Video synchronisers**

**SYN103**

SD frame synchroniser designed for video-only sources. Can be used as a synchroniser or delay line. Cross-locking allows SD or HD analogue syncs to be used as reference. Includes video proc-amp, Relay bypass protection option (with RM67 rear module). Can include integrated fibre connectivity by fitting either the FIP fibre input option or the FOP fibre output option (see page 38).

---

**SYN 3G**

3G/HD/SD frame synchroniser designed for video-only sources. Can be used as a synchroniser or delay line. Cross-locking allows SD or HD analogue syncs to be used as reference for any source. Includes video proc-amp. Relay bypass protection option (with RM67 rear module). Can include integrated fibre connectivity by fitting either the FIP fibre input option or the FOP fibre output option (see page 38).

---

**SYN-A 3G**

3G/HD/SD frame synchroniser designed for embedded audio sources. Can be used as a synchroniser or delay line and allows cross-locking. Works with up to four groups of embedded audio and allows mixture of Dolby E and linear AES within same audio group. Includes audio routing, tracking audio delay, audio resampling, Dolby E alignment, video processing and flexible video and audio delays. SMPTE 2016 AFD data can be added to a signal to describe the aspect ratio to downstream equipment. Relay bypass protection option (with RM67 rear module). Can include integrated fibre connectivity by fitting either the FIP fibre input option or the FOP fibre output option (see page 38).

---

**SYN 3G**

9 Watts

3G/HD/SD frame synchroniser designed for video-only sources. Can be used as a synchroniser or delay line. Cross-locking allows SD or HD analogue syncs to be used as reference. Includes video proc-amp. Relay bypass protection option (with RM67 rear module). Can include integrated fibre connectivity by fitting either the FIP fibre input option or the FOP fibre output option (see page 38).

---

**SYN-A 3G**

9 Watts

3G/HD/SD frame synchroniser designed for embedded audio sources. Can be used as a synchroniser or delay line and allows cross-locking. Works with up to four groups of embedded audio and allows mixture of Dolby E and linear AES within same audio group. Includes audio routing, tracking audio delay, audio resampling, Dolby E alignment, video processing and flexible video and audio delays. SMPTE 2016 AFD data can be added to a signal to describe the aspect ratio to downstream equipment. Relay bypass protection option (with RM67 rear module). Can include integrated fibre connectivity by fitting either the FIP fibre input option or the FOP fibre output option (see page 38).

---

**Which rear module do you need?**

- **SYN103**
  - SD
  - Optical in (SD)
  - Optical out (SD)
  - SD x 4

- **SYN 3G**
  - SD or HD or SD
  - Black & Burst ref or tri-level syncs
  - Optical in (SD)
  - Optical out (SD)
  - SD x 4

- **SYN-A 3G**
  - SD or HD or SD
  - Black & Burst ref or tri-level syncs
  - Optical in (SD)
  - Optical out (SD)
  - SD x 4

---

More at [www.crystalvision.tv...](http://www.crystalvision.tv...)

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Video synchronisers continued...

A video synchroniser with so much functionality on one board...

Combined video synchroniser, tracking audio delay and embedder/de-embedder for 3Gbps, HD and SD video and both analogue and digital audio. Can be used as synchroniser or delay line and allows cross-locking. Can embed and de-embed a mixture of up to four groups of AES and two groups of analogue audio, depending on number of audio piggybacks fitted (see page 47). Includes sophisticated audio routing, video and audio processing and delay compensation. Can include integrated fibre connectivity by fitting either the FIP fibre input option, FOP fibre output option or FIO fibre input and output option (see page 38).

Sophisticated Dolby E handling: synchronise video containing mixture of Dolby E and linear AES within same audio group and auto-correct timing errors with the guardband. Can be used to decode Dolby E by fitting the Dolby decoder option (see page 48), and allows SMPTE 2020 embedding and de-embedding.

Use it... Because its combination of features make it the best solution for any embedding, de-embedding and timing requirements – whatever sources you’re working with.

**What is SYNNER 310?**

- **Video in** (BNC or fibre)
- **Video out** (BNC or fibre)
- **Analogue reference**
- **AES or analogue audio in**
- **AES or analogue audio out**
- **3G or HD or SD (BNC)**
- **Black & Burst ref or tri-level syncs**
- **8 x AES/Dolby E or 8 x analogue audio in or out (D-Type)**
- **Black & Burst ref or tri-level syncs**

**SYNNER 310**

9 Watts

**Remote control**

**Dual channel**

**Standard Definition**

**High Definition**

**3Gbps**

**Framestore synchroniser**

**APC features**

**Dolby E compatible**

**Processes 4 audio groups**

**Integrated fibre**

**Relay bypass protection**

---

**What rear module do you need?**

- **3G or HD or SD**
  - **Black & Burst ref or tri-level syncs**
  - **3G or HD or SD x 2**
  - **3G or HD or SD (BNC)**
  - **Black & Burst ref or tri-level syncs**

---

**SYNNER 310**

**RM47**

**RM59**

**RM61**

**RM58 + RM46**

**RM59 + RM46**

**RM70**

**RM74**

**More at www.crystalvision.tv...**
Everything modular: Video interface

Video synchronisers continued...

Understanding SYNNER 310...

...Continued
Switching

Crystal Vision offers a variety of 2 x 2 switches and small routers for 3Gb/s, HD and SD sources – products that broadcasters rely on to keep them on air. Use them as your emergency transmission switch if you need to avoid broken equipment or use them to manually bypass products requiring maintenance. Guarantee yourself a clean switch with the fail-safe Safe Switch 3G which uses a full framestore synchroniser on each input (plus the ability to delay the earliest arriving input by up to 25 frames) to correct for any timing difference. Replacing a switch and two synchronisers, Safe Switch 3G gives you the functionality of three products on one board – and it can even lose the reference and not affect the output. And always get the best output by switching on even a really subtle fault – our switches will intelligently choose the better output based on the audio and video parameters that are most important to you. Alternatively you can use our small router to send eight sources to up to three destinations.

### Which routing switch do you need?

<table>
<thead>
<tr>
<th>Safe Switch 3G</th>
<th>Safe Switch-L 3G</th>
<th>SW221 3G</th>
<th>Smart Switch 3G</th>
<th>SW803 3G</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main use</strong></td>
<td>Manual or automatic clean and intelligent switching</td>
<td>Manual or automatic clean and intelligent switching</td>
<td>Manual or automatic simple switching</td>
<td>Manual or automatic intelligent switching</td>
</tr>
<tr>
<td><strong>Input formats</strong> (50Hz and 59.94Hz where unspecified)</td>
<td>1080p, 720p, 1080i, 625i, 525i</td>
<td>1080p, 720p, 1080i, 625i, 525i</td>
<td>1080p/59.94/60, 720p/59.94/60, 1080/59.94/60, 625i, 525i</td>
<td>1080p/59.94/60, 720p/59.94/60, 1080/59.94/60, 625i, 525i</td>
</tr>
<tr>
<td><strong>Input/output configuration</strong></td>
<td>2 x 2</td>
<td>2 x 2</td>
<td>2 x 2</td>
<td>2 x 2</td>
</tr>
<tr>
<td><strong>Output feeds (max)</strong></td>
<td>2 of Output 1 and 1 of Output 2</td>
<td>2 of Output 1 and 2 of Output 2</td>
<td>2 of Output 1 and 1 of Output 2</td>
<td>2 of Output 1 and 1 of Output 2</td>
</tr>
<tr>
<td><strong>Automatically trigger switch</strong></td>
<td>18 fault conditions</td>
<td>18 fault conditions</td>
<td>Loss of input or invalid video or invalid format</td>
<td>20 fault conditions</td>
</tr>
<tr>
<td><strong>Reference</strong></td>
<td>Analogue</td>
<td>Analogue (with reference loop)</td>
<td>Analogue or digital</td>
<td></td>
</tr>
<tr>
<td><strong>Loss of reference protection</strong></td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Relay bypass protection</strong></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Fibre output</strong></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Remote control</strong></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>GPI inputs and outputs</strong></td>
<td>6 bi-directional GPs</td>
<td>12 bi-directional GPs</td>
<td>4 GPI inputs and 2 GPI outputs</td>
<td>5 GPI inputs and 1 GPI output</td>
</tr>
<tr>
<td><strong>Frame slots used</strong></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
The way to guarantee a clean switch – with a full framemstore synchroniser on each input...

**Safe Switch 3G**

11.9 Watts

**Safe Switch-L 3G**

16.4 Watts

The way to guarantee a clean switch. Designed for both automatic and manual switching applications, this clean and intelligent 2 x 2 switch works with 3Gb/s, HD and SD. How does it prevent disruption to the output picture when a switch takes place? A full framemstore synchroniser on each input, plus the ability to delay the earliest arriving input up to 25 frames, allows it to correct for any timing difference between the two inputs. You can even lose the reference signal and not affect the output: it will change its timing smoothly between the reference and the inputs, keeping the output valid at all time. Monitor any number of 18 video and audio parameters to intelligently auto trigger a switch – it will work to the most significant feature when deciding which input to select, and you can even specify different fault conditions for each feed. Horizontal and vertical timing adjustments and cross-locking. Includes relay bypass protection. Bi-directional GPIs can be configured as either GPI inputs or GPI outputs, with six GPIs on Safe Switch 3G and 12 on Safe Switch-L 3G.

What you only get with Safe Switch 3G... Can include integrated fibre output connectivity by fitting the FOP fibre output option (see page 38). This ‘single decker’ PCB uses one frame slot.

What you only get with Safe Switch-L 3G... Input and reference loop-throughs and an extra feed of output B, plus more of the bi-directional GPIs. This ‘double decker’ PCB fits in two frame slots.

**Here’s a typical application...**

Use Safe Switch 3G on the final output stage of your transmission system to balance the delays between the main and backup feeds – and keep the MPEG encoder happy.

More at [www.crystalvision.tv](http://www.crystalvision.tv)...
Routing switches continued...

Understanding the Safe Switch 3G...

- **Relay bypass**
  - 3Gb/s or HD or SD 1A on RM54 (Safe Switch 3G)
  - 3Gb/s or HD or SD 1B (not with RM66)
  - Optical output 1A with RM66 (Safe Switch 3G only)
  - 3Gb/s or HD or SD 2A
  - 3Gb/s or HD or SD 2B (Safe Switch-L 3G only)

- **CPU**
  - Board edge control
  - Remote control
  - Bi-directional GPIs – x 6 (Safe Switch 3G)
  - x 12 (Safe Switch-L 3G)

- **Equalise and reclock**
  - 3Gb/s or HD or SD input 1
  - 3Gb/s or HD or SD input 2

- **0-25 frame delay**
  - 3Gb/s or HD or SD loop (Safe Switch-L 3G only)

- **Video synchroniser**
  - Timing adjust 0 - 1 frame

- **Tri-level syncs or Black & Burst analogue reference**

- **Analogue reference loop (on rear module) (Safe Switch-L 3G only)**

- **FOP Optical output 1A with RM66 (Safe Switch 3G only)**

- **Input video and audio check and timing generator**

- **Board edge control**

- **Remote control**

- **Bi-directional GPIs – x 6 (Safe Switch 3G)**
  - x 12 (Safe Switch-L 3G)

- **Output 1**
  - 3Gb/s or HD or SD 1A on RM54 (Safe Switch 3G)
  - 3Gb/s or HD or SD 1B (not with RM66)

- **Output 2**
  - 3Gb/s or HD or SD 2A
  - 3Gb/s or HD or SD 2B (Safe Switch-L 3G only)

- ** everything modular: Video interface**
Everything modular: Video interface

Routing switches continued...

**Smart Switch 3G**

Intelligent 2 x 2 switch which works with 3Gb/s, HD and SD and ideal for securing the video output in systems that need high reliability. Monitors two inputs with up to four groups of embedded audio and will automatically switch between sources if a specified fault condition arises and standby is free of that fault. Select any number of 20 different video and audio parameters to monitor, including input missing, input video standard incorrect, various EDH and CRC errors, video black, video frozen, audio group missing, silence on a specific audio channel and four Boolean parameters. Will work to the most significant feature to decide which input to select, with error priority rating. Includes relay bypass protection option (with RM54 rear module).

**Which rear module do you need?**

- **3G or HD or SD**
- **3G or HD or SD x 2**

**SW221 3G**

Emergency 2 x 2 switch which works with 3Gb/s, HD and SD. Provides two reclocked outputs of the first switched signal and one of the second. Includes relay bypass protection option (with RM54 rear module).

**Which rear module do you need?**

- **3G or HD or SD**
- **3G or HD or SD x 2**

**SW803 3G**

Space-saving 8 x 3 crosspoint routing switch which works with 3Gb/s, HD and SD. Can route the eight inputs to any of the three outputs. All outputs are DVB-ASI compatible. ‘Double decker’ PCB which fits in two frame slots. Ideal as small or secondary matrix. Dedicated control panel available: SW803 Controller (see page 53).

**Which rear module do you need?**

- **3G or HD or SD**
- **3G or HD or SD x 2**
- **Black & Burst ref or tri-level syncs**

More at [www.crystalvision.tv...](http://www.crystalvision.tv...)
### Which video delay do you need?

<table>
<thead>
<tr>
<th></th>
<th>VIVID 3G</th>
<th>VIVID 3GS</th>
<th>VIVID 3G-20</th>
<th>VIVID 3GS-20</th>
<th>VIVID HD-40</th>
<th>AVDELAY 3G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Works with SD</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Works with HD</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Works with 3Gb/s</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
</tbody>
</table>

**Maximum SD delay (in seconds):**
- VIVID 3G: 5.5 secs (625 line), 4.5 secs (525 line)
- VIVID 3GS: 5.5 secs (625 line), 4.5 secs (525 line)
- VIVID 3G-20: 110 secs (625 line), 91 secs (525 line)
- VIVID 3GS-20: 110 secs (625 line), 91 secs (525 line)
- VIVID HD-40: 238 secs, 10.2 secs (625 line), 8.5 secs (525 line)

**Maximum SD delay (in frames):**
- VIVID 3G: 5950 frames (625 line), 7132 frames (525 line)
- VIVID 3GS: 255 frames (625 line), 255 frames (525 line)
- VIVID 3G-20: 5950 frames (625 line), 7132 frames (525 line)
- VIVID 3GS-20: 255 frames (625 line), 255 frames (525 line)
- VIVID HD-40: 46us, 1 frame

**Minimum SD delay:**
- VIVID 3G: 3 lines
- VIVID 3GS: 3 lines
- VIVID 3G-20: 3 lines
- VIVID 3GS-20: 3 lines
- VIVID HD-40: 1 frame

**Maximum HD delay (in seconds):**
- VIVID 3G: 1 sec (1080i50, 720p50, 1080PsF23.98 and 1080PsF24)
- VIVID 3GS: 0.8 secs (1080i50, 720p50, 1080PsF23.98 and 1080PsF24)
- VIVID 3G-20: 20 secs (1080i50, 720p50, 1080PsF23.98 and 1080PsF24)
- VIVID 3GS-20: 16 secs (1080i50, 720p50, 1080PsF23.98 and 1080PsF24)
- VIVID HD-40: 110 secs (625 line), 91 secs (525 line)

**Maximum HD delay (in frames):**
- VIVID 3G: 25 frames
- VIVID 3GS: 25 frames
- VIVID 3G-20: 500 frames
- VIVID 3GS-20: 500 frames
- VIVID HD-40: 20 secs (1080i50, 720p50, 1080PsF23.98 and 1080PsF24)

**Minimum HD delay:**
- VIVID 3G: 2 lines
- VIVID 3GS: 2 lines
- VIVID 3G-20: 2 lines
- VIVID 3GS-20: 2 lines
- VIVID HD-40: 12us, 1 frame

**Maximum 3Gb/s delay (in seconds):**
- VIVID 3G: 0.5 secs (1080p50), 0.4 secs (1080p59.94)
- VIVID 3GS: 0.5 secs (1080p50), 0.4 secs (1080p59.94)
- VIVID 3G-20: 10 secs (1080p50), 8 secs (1080p59.94)
- VIVID 3GS-20: 10 secs (1080p50), 8 secs (1080p59.94)
- VIVID HD-40: 10 secs (1080p50), 8 secs (1080p59.94)

**Maximum 3Gb/s delay (in frames):**
- VIVID 3G: 25 frames
- VIVID 3GS: 25 frames
- VIVID 3G-20: 500 frames
- VIVID 3GS-20: 500 frames
- VIVID HD-40: 127 frames (1080p50), 127 frames (1080p50/1080p59.94), 2150 frames (720p50), 255 frames (720p50), 255 frames (720p50/1080p50)

**Minimum 3Gb/s delay:**
- VIVID 3G: 2 lines
- VIVID 3GS: 2 lines
- VIVID 3G-20: 2 lines
- VIVID 3GS-20: 2 lines
- VIVID HD-40: 1 frame

**Video delay adjustable in:**
- Seconds, frames, lines and pixels

**Independently adjustable audio delay:**
- Follows video

**Max audio delay:**
- Follows video

**Min audio delay:**
- Follows video

**Audio delay adjustable in:**
- Seconds, video frames and milliseconds

**Number of video outputs (max):**
- 4 (3 if fibre i/O)
- 4 (3 if fibre i/O)
- 4 (3 if fibre i/O)
- 4 (3 if fibre i/O)
- 3
- 2

**Video framstore synchroniser:**
- SD Black and Burst or HD tri-level syncs

**Analogue reference:**
- SD Black and Burst or HD tri-level syncs

**Passes entire video stream including embedded audio:**
- SD Black and Burst or HD tri-level syncs

**Dolby E alignment:**
- SD Black and Burst or HD tri-level syncs

**Video proc-amp (RGB and YUV lift and gain controls):**
- SD Black and Burst or HD tri-level syncs

**Video and audio alarms:**
- 4
- 6
- 4
- 6
- 16
- 16
- 16
- 16
- 21

**Number of presets:**
- 16
- 16
- 16
- 16
- 16
- 16
- 16
- 16
- 21

**Relay bypass protection:**
- (RM67 option)
- (RM67 option)
- (RM67 option)
- (RM67 option)
- (as standard)

**Fibre I/O:**
- SD Black and Burst or HD tri-level syncs

**Boards in 2U:**
- 12
- 12
- 12
- 12
- 12
- 12
- 12
- 12

**Rear module used:**
- RM41, RM57 and RM67
- RM41, RM57 and RM67
- RM41, RM57 and RM67
- RM41, RM57 and RM67
- RM44
- RM62
Video delay

No one else does the range of video delays that we do. Providing up to ten seconds of 3Gb/s delay, 43 seconds of HD delay and four minutes of SD delay, the ViViD variable video delay lines are ideal for use anywhere you need to match delays in your system – virtual studio graphics, MPEG encoders/decoders, satellite and HD radio links, audio processing and profanity delays. They can delay any embedded data, while the small physical size of the ViViD modules mean you can fit 12 of them in 2U – alongside any other products. You can even use the framestore synchroniser to apply a long delay to a video path and lock the signal to a station reference using a neat single board solution. And if you have got a difference in timing between your video and audio paths, you can use the AVDELAY 3G to change the relative audio/video timing by up to ten seconds in either direction – and get rid of those large lip-sync errors.

ViViD 3G

11.9 Watts

3G/HD/SD variable video delay with framestore synchroniser, designed to match delays elsewhere in system. Maximum 3Gb/s delay of 0.5 seconds. Maximum HD delay of 1 second. Maximum SD delay of 5.5 seconds. Easy to get just the delay you need: adjustable in seconds, frames, lines and pixels. Features video proc-amp. Relay bypass protection option (with RM67 rear module). Can include integrated fibre connectivity by fitting either the FIP fibre input option or the FOP fibre output option (see page 38).

Which rear module do you need?

ViViD 3G-20

11.9 Watts

3G/HD/SD long variable video delay designed to match extended system delays. Maximum 3Gb/s delay of 10 seconds. Maximum HD delay of 20 seconds. Maximum SD delay of 110 seconds. Easy to get just the delay you need: adjustable in seconds, frames, lines and pixels. Features video proc-amp. Relay bypass protection option (with RM67 rear module). Can include integrated fibre connectivity by fitting either the FIP fibre input option or the FOP fibre output option (see page 38).

Which rear module do you need?

VIVID 3GS

11.9 Watts

3G/HD/SD variable video delay with framestore synchroniser, designed to match delays elsewhere in system. Maximum 3Gb/s delay of 0.5 seconds. Maximum HD delay of 1 second. Maximum SD delay of 5.5 seconds. Easy to get just the delay you need: adjustable in seconds, frames, lines and pixels. Features video proc-amp. Relay bypass protection option (with RM67 rear module). Can include integrated fibre connectivity by fitting either the FIP fibre input option or the FOP fibre output option (see page 38).

Which rear module do you need?
Video delays continued...

**VIVID 3G-20** 11.9 Watts

3G/HD/SD long variable video delay with framstore synchroniser, designed to match extended system delays. Maximum 3Gbps delay of 10 seconds. Maximum HD delay of 20 seconds. Maximum SD delay of 110 seconds. Easy to get just the delay you need: adjustable in seconds, frames, lines and pixels. Features video proc-amp. Relay bypass protection option (with RM67 rear module). Can include integrated fibre connectivity by fitting either the FIP fibre input option or the FOP fibre output option (see page 38).

Which rear module do you need?

<table>
<thead>
<tr>
<th>Module</th>
<th>3G or HD or SD</th>
<th>3G or HD or SD (BNC)</th>
<th>Optical in</th>
<th>Optical out</th>
</tr>
</thead>
<tbody>
<tr>
<td>VIVID 3G-20 RM41</td>
<td>Single height</td>
<td>3G or HD or SD</td>
<td>3G or HD or SD</td>
<td>3G or HD or SD</td>
</tr>
<tr>
<td>VIVID 3G-20 RM47</td>
<td>Single height</td>
<td>3G or HD or SD x 4</td>
<td>Optical in</td>
<td>Optical out</td>
</tr>
</tbody>
</table>

**VIVID HD-40** 12 Watts

HD/SD long variable video delay designed to match extended system delays. Maximum HD delay of 43 seconds. Maximum SD delay of 238 seconds. Easy to get just the delay you need: adjustable in seconds, frames, lines and pixels. Includes relay bypass protection.

Which rear module do you need?

<table>
<thead>
<tr>
<th>Module</th>
<th>HD or SD</th>
<th>HD or SD x 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>VIVID HD-40 RM44</td>
<td>Single height</td>
<td>HD or SD x 3</td>
</tr>
</tbody>
</table>

Audio/video delay

**AVDELAY 3G** 11 Watts

Audio/video delay designed for correcting large lip-sync errors on incoming 3Gbps, HD or SD signals containing up to four groups of embedded audio, with the ability to change the relative audio/video timing by several seconds in either direction. Provides up to ten seconds of video delay in SD, five seconds in HD and two seconds in 3Gbps (depending on format), adjustable in seconds and frames. Up to ten seconds of audio delay, adjustable in seconds, video frames and milliseconds. Sophisticated handling of Dolby E with correct guardband alignment. Can include integrated fibre connectivity by fitting either the FIP fibre input option or the FOP fibre output option (see page 38).

Which rear module do you need?

<table>
<thead>
<tr>
<th>Module</th>
<th>3G or HD or SD</th>
<th>3G or HD or SD x 2</th>
<th>Optical in</th>
<th>Optical out</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVDELAY 3G RM62</td>
<td>Single height</td>
<td>3G or HD or SD</td>
<td>3G or HD or SD x 3</td>
<td>3G or HD or SD</td>
</tr>
</tbody>
</table>

Here’s a typical application...

Getting signals from one side of the world to the other can introduce a time difference between the video and audio paths...
Colour correction

Whether you need to adjust the colours on in-shot plasma displays, set the range of colours for an encoder to transmit or correct computer-generated and post-production outputs, Crystal Vision provides a cost-effective and space-saving solution – with clever features not usually available at this price level. Designed for whole picture colour correction and legalising, our 100mm x 266mm board provides numerous RGB and YUV adjustments including gamma, advanced correction for gamut errors and control options to suit all preferences (including a hands-on control panel). It also gives you preview mode with illegal signal value highlighting, relay bypass protection and integrated fibre connectivity – as well as support for 25 different video standards.

CoCo 3G's wide range of tools to adjust the picture

CoCo 3G's wide range of tools to adjust the picture in any digital image

Colour corrector and legaliser

CoCo 3G

11 Watts

Space-saving modular colour corrector and legaliser which works with 3Gb/s, HD and SD. Ideal for manipulating the colours in a digital image, allowing whole picture adjustments in both the YUV and RGB colour spaces. Supports 25 different video standards, including the 23.98, 24 and 25 frames per second progressive video standards for film to HD video transfers. Wide range of tools to adjust level, gain and gamma – including individual red, blue and green gamma controls. Changes YUV colours illegal in RGB to be valid in RGB, with advanced correction for gamut errors in which the colour is legalised by desaturating it without changing its hue. Includes relay bypass protection option (with RM64 rear module). Can include integrated fibre connectivity by fitting either the FIP fibre input option or the FOP fibre output option (see page 38). Dedicated control panel available: CoCo 3G Controller (see page 55).

Which rear module do you need?

CoCo 3G RM41

Single height

3G or HD or SD main x 2
3G or HD or SD aux x 3

CoCo 3G RM64

3G or HD or SD main x 2 (relay bypass protection on main 1)
3G or HD or SD aux

CoCo 3G RM67

Fibre in or out Single height

3G or HD or SD aux

Optical out (same as aux)

Optical out

CoCo 3G

NB. Choose between fibre in or fibre out by selecting FIP or FOP fibre option

More at www.crystalvision.tv...
Fibre optics

Crystal Vision provides a dedicated fibre optic transmitter and receiver for transporting 3Gbps, HD and SD sources over large distances, which can be easily used in conjunction with our products. Alternatively, some boards (see the chart on the right) feature the option of integrated fibre connectivity in a single slot by fitting either the FIP fibre input option, FOP fibre output option or FIO fibre input and output option directly to the motherboard. All the fibre boards use a Class I laser and are designed for SMPTE 297-2006 short-haul applications. Crystal Vision can additionally provide CWDM lasers for the FTX-L 3G transmitter and FOP fibre output option – allowing you to get multiple signals through one fibre and saving you money and rack space.

Fibre optic transmitters and receivers

FTX-L 3G

Dual channel 3Gbps, HD or SD to fibre optic transmitter. Works with both multi-mode and single-mode fibre and provides robust transport medium for transmitting 3Gbps, HD or SD over large distances. DVB-ASI compatible. Includes two input loop-throughs ideal for system checking or distributing input video. Fits in standard frames allowing it to be easily used with any of the interface, keying or picture storage modules. Ideal companion product to FRX 3G receiver. CWDM option available: please order the FTX-L-CWDM 3G and inform Crystal Vision the two laser wavelengths you require.

Which rear module do you need?

- Optical 3G or HD or SD loop

FRX 3G

Dual channel fibre optic to 3Gbps, HD or SD receiver. Works with both multi-mode and single-mode fibre and provides robust transport medium for transmitting 3Gbps, HD or SD over large distances. DVB-ASI compatible. Fits in standard frames allowing it to be easily used with any of the interface, keying or picture storage modules. Ideal companion product to FTX-L 3G transmitter.

Which rear module do you need?

- Optical 3G or HD or SD x 2

Fibre input and output options

<table>
<thead>
<tr>
<th>FIP</th>
<th>FOP</th>
<th>FIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up-Down 3G range (Pages 15 – 16)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up-Down-AS 3G range (Page 16)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q-Down-AG 3G range (Page 17)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARC-20MC (Page 25)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SYN103 (Page 27)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SYN 3G (Page 27)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SYN-A 3G (Page 27)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SYNNER 310 (Page 28)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safe Switch 3G (Page 31)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIVID 3G range (Pages 35 – 36)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AVDELAY 3G (Page 36)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CoCo 3G (Page 37)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TANDEM 310 (Page 40)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FIP

0.6 Watts

Fibre input option.

FOP

0.6 Watts

Fibre output option. CWDM option available: please order the FOP-CWDM and inform Crystal Vision the laser wavelength you require.

FIO

1 Watt

Fibre input and output option.
## Which audio embedder do you need?

<table>
<thead>
<tr>
<th>Feature</th>
<th>TANDEM 310</th>
<th>TANDEM 320</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input formats</strong></td>
<td>1080p, 1080PsF24, 1080PsF23.98, 720p, 1080i, 625i, 525i</td>
<td>1080p, 1080PsF24, 1080PsF23.98, 720p, 1080i, 625i, 525i</td>
</tr>
<tr>
<td><strong>Single or dual channel</strong></td>
<td>Single</td>
<td>Dual</td>
</tr>
<tr>
<td><strong>Embed and de-embed at same time</strong></td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td><strong>Embed/de-embed digital audio</strong></td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td><strong>Embed/de-embed analogue audio</strong></td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td><strong>Embed/de-embed synchronous Dolby E</strong></td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td><strong>Number of internal audio groups processed</strong></td>
<td>4</td>
<td>4 per channel</td>
</tr>
<tr>
<td><strong>Number of external I/O channels available for embedding/de-embedding</strong></td>
<td>AES: 8 stereo pairs (4 groups) Analogue audio: 8 mono (2 groups)</td>
<td>AES: 8 stereo pairs per channel (2 groups) Analogue audio: 4 mono per channel (1 group)</td>
</tr>
<tr>
<td><strong>Number of piggybacks used</strong></td>
<td>2 (DIOP4, 3G-AIP2, 3G-AOP2)</td>
<td>1 per channel (DIOP4, 3G-AIP2, 3G-AOP2)</td>
</tr>
<tr>
<td><strong>Audio routing</strong></td>
<td>Mono routers auto configured according to options fitted</td>
<td>Mono routers auto configured according to options fitted</td>
</tr>
<tr>
<td><strong>Minimum embedding audio delay</strong></td>
<td>&lt;200us</td>
<td>&lt;200us</td>
</tr>
<tr>
<td><strong>Additional audio delay</strong></td>
<td>400ms</td>
<td>400ms</td>
</tr>
<tr>
<td><strong>Minimum video delay</strong></td>
<td>1 line</td>
<td>2 lines</td>
</tr>
<tr>
<td><strong>Additional video delay</strong></td>
<td>Up to 10 frames additional user delay in one frame steps</td>
<td></td>
</tr>
<tr>
<td><strong>Number of video outputs (max)</strong></td>
<td>2</td>
<td>1 per channel</td>
</tr>
<tr>
<td><strong>Can decode Dolby E</strong></td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td><strong>SMPTE 2020 embedding/de-embedding</strong></td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td><strong>Audio resampling</strong></td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td><strong>Audio processing (gain, stereo to mono)</strong></td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td><strong>Video proc-amp (RGB and YUV lift and gain)</strong></td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td><strong>Comprehensive signal monitoring (video and audio alarms)</strong></td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td><strong>Fibre I/O</strong></td>
<td>G</td>
<td></td>
</tr>
<tr>
<td><strong>Max channels in 2U (depends on rear module)</strong></td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td><strong>Min frame slots used (depends on rear module)</strong></td>
<td>1 (2 if Dolby option fitted)</td>
<td>1</td>
</tr>
</tbody>
</table>

More at [www.crystalvision.tv](http://www.crystalvision.tv)...
Audio embedding and de-embedding

Whether you’re dealing with analogue or digital audio, the TANDEM range can provide the answer for every embedded audio application, from the most basic to the most sophisticated. In addition to the embedding and de-embedding of up to four groups of audio, our feature-packed modules allow you to shuffle, replace, delay, process and monitor your audio – and can even include integrated fibre input or output connectivity, allowing you to embed or de-embed signals from beyond your local equipment bay. Use the dual channel TANDEM 320 for those price-sensitive or space-sensitive applications, or fit a Dolby option top board to the powerful TANDEM 310 for the easy decoding of Dolby E signals.

**Embedders/de-embedders**

Powerful embedding and de-embedding of multiple groups of both AES and analogue audio at the same time...

**TANDEM 310**

Combined audio embedder and de-embedder for 3Gb/s, HD and SD video and both analogue and digital audio. Can embed and de-embed a mixture of up to four groups of AES and two groups of analogue audio, depending on number of audio piggybacks fitted (see page 47). Includes sophisticated audio routing, video and audio processing, Dolby E handling and delay compensation with 400ms of audio delay and ten frames of video delay. Can include integrated fibre connectivity by fitting either the FIP fibre input option, FOP fibre output option or FIO fibre input and output option (see page 38). Can be used to decode Dolby E by fitting the Dolby decoder option (see page 48), and allows SMPTE 2020 embedding and de-embedding.

**Which rear module do you need?**

**NB.** Choose between fibre in or fibre out by selecting FIP or FOP option.

**NB.** Select FIP option for fibre in, FOP option for fibre out and FIO option for fibre in and out.

**NB.** Also intended for non-Dolby applications using 75 ohm AES.

---

More at [www.crystalvision.tv...](http://www.crystalvision.tv...)
Everything modular: Audio interface

Embedders/de-embedders continued...

Understanding TANDEM 310...

1. Dolby option router
2. Dolby decoder option
3. Dolby E detect
4. Audio gain and resampling
5. AES
6. Metadata out (from decoder)
7. Embed SMPTE 2020 metadata
8. Embed four groups
9. To 2020 embedder
10. Metadata out

Audio interface
Embedders/de-embedders

Mono routing (auto configured according to piggyback and Dolby options fitted)
Mute
Invert
Delay
Stereo to mono on/off

Dolby E detect
Audio gain and resampling
AES
detected from Dolby E

Adjustable
downmix

Lt/Rt downmix
Lo/Br downmix

Dolby decoder option

AES (decoded from Dolby E)

Dolby option router

4 AES pairs (8 channels) or 2 Analogue pairs (4 channels)

3Gb/s or HD or SD

Video delay (0 to 10 frames)

Video proc-amp (RGB and YUV)

De-embed four groups

FOP or FIO

Optical output (optional)

3Gb/s or HD or SD x 2

or 1 if using RM50 or RM61

FIP or FIO

Optical input (optional)

8 AES/Dolby E pairs

3Gb/s or HD or SD

Embed four groups

Optical output (optional)

8 AES/Dolby E pairs

3Gb/s or HD or SD x 2

or 1 if using RM50 or RM61

FOP or FIO

Optical output (optional)

8 AES/Dolby E pairs

3Gb/s or HD or SD

Embed four groups

Optical output (optional)

8 AES/Dolby E pairs

3Gb/s or HD or SD x 2

or 1 if using RM50 or RM61

FOP or FIO

Optical output (optional)

8 AES/Dolby E pairs

3Gb/s or HD or SD

Embed four groups

Optical output (optional)

8 AES/Dolby E pairs

3Gb/s or HD or SD x 2

or 1 if using RM50 or RM61

FOP or FIO

Optical output (optional)

8 AES/Dolby E pairs

3Gb/s or HD or SD

Embed four groups

Optical output (optional)

8 AES/Dolby E pairs

3Gb/s or HD or SD x 2

or 1 if using RM50 or RM61

FOP or FIO

Optical output (optional)

8 AES/Dolby E pairs

3Gb/s or HD or SD

Embed four groups

Optical output (optional)

8 AES/Dolby E pairs

3Gb/s or HD or SD x 2

or 1 if using RM50 or RM61

FOP or FIO

Optical output (optional)

8 AES/Dolby E pairs

3Gb/s or HD or SD

Embed four groups

Optical output (optional)

8 AES/Dolby E pairs

3Gb/s or HD or SD x 2

or 1 if using RM50 or RM61

FOP or FIO

Optical output (optional)

8 AES/Dolby E pairs

3Gb/s or HD or SD

Embed four groups

Optical output (optional)

8 AES/Dolby E pairs

3Gb/s or HD or SD x 2

or 1 if using RM50 or RM61

FOP or FIO

Optical output (optional)

8 AES/Dolby E pairs

3Gb/s or HD or SD

Embed four groups

Optical output (optional)

8 AES/Dolby E pairs

3Gb/s or HD or SD x 2

or 1 if using RM50 or RM61

FOP or FIO

Optical output (optional)
Embedders/de-embedders continued...

The dual channel way to fit 24 channels of embedding and de-embedding in 2U...

**TANDEM 320**

Dual channel audio embedder and de-embedder for 3Gb/s, HD and SD video and both analogue and digital audio. Ideal for price-sensitive or space-sensitive applications. Embed and de-embed a mixture of up to two groups of AES and one group of analogue audio per video channel, by fitting one audio piggyback per channel (see page 47). Will pass through and route four groups of internal audio. Includes sophisticated audio routing, audio processing, Dolby E handling and delay compensation with 400ms of audio delay.

*Use it instead of TANDEM 310...* If you’re working with multiple channels of straightforward embedding and de-embedding which don’t require TANDEM 310’s advanced features. (See audio embedder comparison chart on page 39 to help you decide.)

Which rear module do you need?

**TANDEM 320**

9.3 Watts

- **RM71** Single height
  - 3G or HD or SD channel A
  - 3G or HD or SD
  - 4 x AES/Dolby E or 4 x analogue audio in or out (T-Type)
  - 3G or HD or SD channel A
  - 4 x AES/Dolby E or 4 x analogue audio in or out (T-Type)

- **RM72** Double height
  - 3G or HD or SD channel B
  - 3G or HD or SD
  - 4 x AES/Dolby E or 4 x analogue audio in or out (T-Type)
  - 3G or HD or SD channel B
  - 4 x AES/Dolby E or 4 x analogue audio in or out (T-Type)

**Understanding TANDEM 320...**

- **Delay E**
  - Audio gain and resampling
  - 4 AES pairs (8 channels) or 2 Analogue pairs (4 channels)
  - 3Gb/s or HD or SD channel A

- **De-embed four groups**
  - 3Gb/s or HD or SD channel B
  - 4 AES pairs (8 channels) or 2 Analogue pairs (4 channels)

- **Embed four groups**
  - 3Gb/s or HD or SD channel A
  - 4 AES pairs (8 channels) or 2 Analogue pairs (4 channels)

**TANDEM 320**

RM71

RM72

Remote control

Dual channel

AFD features

3Gb/s

Standard Definition

Integrated fibre

Remote control

Digital Option

HD or SD

Dolby E compatible

High Definition

Processes 4 audio groups

Framestore synchroniser

AFD

Integrated fibre

3Gb/s Relay bypass protection

RM Rear module loop still available when board is removed.
Audio conversion, distribution and delay

Crystal Vision provides a range of Indigo products for converting, distributing, delaying and processing your separate audio – both analogue and digital, with the AES configurable as either 110 ohm or 75 ohm. All the products are at least dual channel, with some even quad channel! Get excellent 24 bit performance when converting between analogue and digital audio. Configure our analogue audio distribution amplifiers in five different ways with varying numbers of inputs and outputs. Select the options you need on the digital audio DAs, with the choice of reclocked and non-reclocked outputs, BNC, D-Type and DIN connectors and even impedance conversion. Or transport a large amount of audio as a block with our MADI DAs. You can also delay your audio – with the DADA208D doubling as both DA and delay and the ADP 310 able to delay analogue or digital audio.

Audio converters

**ADCA412** 6.25 Watts

24 bit dual analogue to AES digital audio converter with excellent noise and distortion figures. Allows 24 audio converters in 2U. Available in two versions, with the AES outputs configured as either 110 ohm balanced or 75 ohm unbalanced depending on which OPAES output module is fitted (see page 47).

Which rear module do you need?

**DACA214** 6.25 Watts

24 bit dual AES digital to analogue audio converter with excellent noise and distortion figures. Allows 24 audio converters in 2U.

Which rear module do you need?

NB. Can be configured so all outputs come from single input
<table>
<thead>
<tr>
<th></th>
<th>AADA416FM</th>
<th>AADA416FR</th>
<th>AADA-STM-1</th>
<th>DADA208</th>
<th>DADA208N</th>
<th>DADA208D</th>
<th>MADDA105</th>
<th>MADDA111</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distributes analogue audio</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distributes AES audio</td>
<td></td>
<td></td>
<td></td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distributes Dolby E</td>
<td></td>
<td></td>
<td></td>
<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distributes MADI (AES10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distributes Word Clock reference</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mono or stereo inputs</td>
<td>Mono or stereo</td>
<td>Mono or stereo</td>
<td>Stereo</td>
<td>Stereo</td>
<td>Stereo</td>
<td>Stereo</td>
<td>MADI multi channel</td>
<td>MADI multi channel</td>
</tr>
<tr>
<td>Mono or stereo outputs</td>
<td>Mono or stereo</td>
<td>Mono or stereo</td>
<td>Mono</td>
<td>Stereo</td>
<td>Stereo</td>
<td>Stereo</td>
<td>MADI multi channel</td>
<td>MADI multi channel</td>
</tr>
<tr>
<td>Stereo to mono conversion</td>
<td></td>
<td></td>
<td></td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Configurable as single, dual, triple or quad channel amplifier</td>
<td>Single, dual, triple or quad</td>
<td>Single, dual, triple or quad</td>
<td>Single or dual</td>
<td>Single or dual</td>
<td>Single or dual</td>
<td>Single or dual</td>
<td>Single</td>
<td>Single</td>
</tr>
<tr>
<td>Maximum number of DAs in 2U</td>
<td>48 (when quad DA)</td>
<td>48 (when quad DA)</td>
<td>24 (when dual DA)</td>
<td>24 (when dual DA)</td>
<td>24 (when dual DA)</td>
<td>24 (when dual DA)</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Max outputs with single amplifier</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Max outputs with dual amplifier</td>
<td>8 per channel, or 4 outputs of channel 1 and 12 of channel 2</td>
<td>8 per channel, or 4 outputs of channel 1 and 12 of channel 2</td>
<td>8 per channel, or 4 outputs of channel 1 and 12 of channel 2</td>
<td>4 per channel</td>
<td>4 per channel</td>
<td>4 per channel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max outputs with triple amplifier</td>
<td>4 outputs of channel 1, 4 of channel 2 and 8 of channel 3</td>
<td>4 outputs of channel 1, 4 of channel 2 and 8 of channel 3</td>
<td>4 outputs of channel 1, 4 of channel 2 and 8 of channel 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max outputs with quad amplifier</td>
<td>4 per channel</td>
<td>4 per channel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reclocking</td>
<td></td>
<td></td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-reclocking</td>
<td></td>
<td></td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uses OPAES sub-module (to select 75 ohm or 110 ohm output)</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audio gain adjustment</td>
<td>Manual adjustment</td>
<td>Manual or remote adjustment</td>
<td>Manual adjustment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audio silence detectors</td>
<td>Manual adjustment</td>
<td>Manual or remote adjustment</td>
<td>Manual adjustment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overvoltage detectors</td>
<td>Manual adjustment</td>
<td>Manual or remote adjustment</td>
<td>Manual adjustment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two audio jacks for local monitoring</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selectable delay of up to one second</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rear modules available</td>
<td>RM17 and RM37</td>
<td>RM17 and RM37</td>
<td>RM17 and RM37</td>
<td>RM01, RM02, RM03, RM12, RM13, RM16 and RM21</td>
<td>RM01, RM02, RM03, RM12, RM13, RM16 and RM21</td>
<td>RM01, RM02, RM03, RM12, RM13, RM16 and RM21</td>
<td>RM41 and RM67</td>
<td>RM41 + RM34 and RM67 + RM34</td>
</tr>
<tr>
<td>Impedance conversion</td>
<td>Use RM12, RM13 or RM21</td>
<td>Use RM12, RM13 or RM21</td>
<td>Use RM12, RM13 or RM21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relay bypass protection</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPI indications</td>
<td>Audio silence and overvoltage status</td>
<td>Audio silence and overvoltage status</td>
<td>Audio silence and overvoltage status</td>
<td>AES signal presence</td>
<td>AES signal presence</td>
<td>AES signal presence</td>
<td>MADI signal presence and power supplies fault</td>
<td>MADI signal presence and power supplies fault</td>
</tr>
<tr>
<td>Remote control</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Quad analogue audio distribution amplifier with flexible inputs and outputs, allowing five different combinations. Outputs are fully floating. Includes gain settings, audio silence detectors and overvoltage detectors. Gives up to 48 DAs in 2U.

What you also get with the AADA416FM… Manual control.

What you also get with the AADA416FR… Both manual and remote control.

Which rear module do you need?

LKEY211
RMO1
AADA416FM
AADA416FR
AADA416FM
AADA416FR
Analogue audio mono x 4 (DIN connector)
Analogue audio mono x 4 (DIN connector)
Analogue audio stereo x 4 (DIN connector)
Analogue audio stereo x 4 (DIN connector)
Analogue audio stereo x 4 (Easywire)
Analogue audio stereo x 4 (Easywire)

NB. Can be configured so all outputs come from single input.
Everything modular: Audio interface

MADI audio distribution amplifiers

MADDA105  2.8 Watts
MADI (AES10) audio distribution amplifier offering a maximum of five outputs. Ideal for transporting large amount of audio as a block, with different sampling rates supported. Relay bypass protection option (with RM67 rear module).

Which rear module do you need?

MADDA111  5.2 Watts
MADI (AES10) audio distribution amplifier offering a maximum of eleven outputs. Ideal for transporting large amount of audio as a block, with different sampling rates supported. Double decker PCB which fits in two frame slots. Relay bypass protection option (with RM67 + RM34 rear module).

Which rear module do you need?

Audio delays

ADP 310  9 Watts
Audio delay line and processor for either four stereo pairs of AES or two stereo pairs (four mono channels) of analogue audio. To configure the system as either digital or analogue, fit one audio input piggyback and one audio output piggyback (see page 47). Provides up 400ms of user adjustable delay. Extensive audio processing includes independent gain adjustments, stereo to mono conversion and channel muting and inversion. Allows audio shuffling.

Which rear module do you need?

DADA208D  2.1 Watts
Combined dual digital audio distribution amplifier and delay line. Gives a maximum of four relocked outputs per channel. Independent delay adjust on each channel of up to one second at 48kHz makes it ideal for matching delays in video processing equipment unable to process embedded audio. Available in two versions, with the AES outputs configured as either 110 ohm balanced or 75 ohm unbalanced depending on which OPAES output module is fitted (see page 47). Also allows impedance conversion.

Which rear module do you need?

Using embedded audio and need to change the relative audio/video timing to correct lip-sync errors?
Have a look at the AVDELAY 3G audio/video delay on page 36.

More at www.crystalvision.tv...
**Audio piggybacks**

Audio piggybacks are small sub-PCBs that fit on to the main motherboard of many of our embedded audio products and allow you to input or output audio. You can easily remove the piggyback and swap it for another, giving increased versatility to your audio products and allowing you to configure them to be exactly what you need on that day. Up to two piggybacks can be fitted to most boards – and you can even mix analogue piggybacks with digital to create a hybrid system.

<table>
<thead>
<tr>
<th>Piggyback</th>
<th>What is it?</th>
<th>Audio channels</th>
<th>Watts</th>
<th>Used for...</th>
</tr>
</thead>
<tbody>
<tr>
<td>3G-AIP2</td>
<td>Analogue audio input piggyback for inputting or embedding analogue audio</td>
<td>2 stereo pairs or 4 mono</td>
<td>1.6</td>
<td>ADP 310, EMDEC-200, SYNTER 310, TANDEM 310 and TANDEM 320</td>
</tr>
<tr>
<td>3G-AOP2</td>
<td>Analogue audio output piggyback for outputting or de-embedding analogue audio</td>
<td>2 stereo pairs or 4 mono</td>
<td>1.5</td>
<td>ADP 310, SYNTER 310, TANDEM 310 and TANDEM 320</td>
</tr>
<tr>
<td>DIOP4</td>
<td>Digital audio input or output piggyback for inputting/embedding or outputting/de-embedding AES audio</td>
<td>4 stereo pairs</td>
<td>0.9</td>
<td>ADP 310, SYNTER 310, TANDEM 310 and TANDEM 320</td>
</tr>
<tr>
<td>HD-DCDV18</td>
<td>PSU which must be fitted if using the 3G-AIP2 piggyback with EMDEC-200 (only)</td>
<td></td>
<td>0.6</td>
<td>EMDEC-200</td>
</tr>
</tbody>
</table>

**Output modules**

If you’re using our digital audio distribution amplifiers or analogue to digital audio converter, then you’ll need to specify whether you want 110 ohm balanced or 75 ohm unbalanced outputs – and it’s easy to do this just by fitting one of our OPAES modules. Or distribute Word Clock by fitting the OP-WDCLK.

**OPAES-110**

110 ohm AES output module. One of the OPAES modules must be fitted to the boards listed below.
*Used for: ADCA412, DADA208, DADA208D and DADA208N.*

**OPAES-75**

75 ohm AES output module. One of the OPAES modules must be fitted to the boards listed below.
*Used for: ADCA412, DADA208, DADA208D and DADA208N.*

**OP-WDCLK**

Output module for TTL level Word Clock distribution.
*Used for: DADA208N.*
Dolby option

Crystal Vision’s Dolby decoder option is a more convenient and space-saving way to decode Dolby E signals that need to be de-embedded or re-embedded, rather than using a separate product for the task. The Dolby decoder option is a top board which connects directly to the embedder or synchroniser module through an expansion connector, easily hooking into the onboard audio router. If a Dolby decoder option is fitted, the main board will require two frame slots.

DA6
3 Watts
Top board which fits on to the motherboard and provides an additional six reclocked input loop-throughs for the up and down convertors and aspect ratio convertors.


ML-GPI8
0.6 Watts
Top board for logo keyers providing additional eight GPI inputs for recalling eight presets, along with additional eight GPI outputs which show which of the eight presets was recalled most recently via the GPI input.

Used for: MultiLogo V132 and MultiLogo V132 8G.

Top boards

Top boards are sub-boards which can be added to the main board to provide additional signals. If a top board is fitted, the main board will require two frame slots.

ML-GPI8
0.6 Watts
Top board for logo keyers providing additional eight GPI inputs for recalling eight presets, along with additional eight GPI outputs which show which of the eight presets was recalled most recently via the GPI input.

Used for: MultiLogo V132 and MultiLogo V132 8G.
Everything modular: Rear modules

**Indigo frame rear modules**

Crystal Vision offers a wide choice of rear modules which slot on to the back of the Indigo frames. Designed to provide the answer to customers’ individual needs they offer varying numbers of inputs, outputs and loop-through options along with the choice of BNC, D-type, ‘easywire’ DIN 41612, RJ45 and optical connectors. The single and double slot rear modules can be used with all three Indigo frame sizes, while the quad slot just fit the 2U frames. Each rear module has a selection of labels suitable for different products. The Vision system uses different rear modules.

### Frame rear modules

#### Board positioning rules

Two slot high rear modules: The board is always placed in the upper of the two slots, with the exception of the RM74 where the board is placed in the lower slot. These rear modules must occupy either the upper or lower pair of frame slots.

Quad slot ‘video’ rear modules (RM02 and RM25): The boards should be placed in the top slot, the next slot down and the bottom slot.

Quad slot ‘audio’ rear module (RM14): The boards are placed in the top three slots.

Fibre boards: A fibre board (or a board fitted with a FIP, FOP or FIO fibre option) can be housed in any frame slot position but due to its extra height it is not possible to place most Standard Definition or audio boards directly above it when the fibre board is in even numbered slot positions.

#### RM01

- **Used for:** ADDE-210, ADDE-310, ALLDAC, DADA208, DADA208B, DADA208B, MON210, REFGEN, VDA110M HD, VDA110R HD and VDA210M HD
- **Connectors:** 6 BNCs
- **Frame slots used:** 4 (for 3 boards)
- **Boards in 2U:** 12 1U: 6  DTB: 2

#### RM02

- **Used for:** ALLDAC, DADA208, DADA208B, DADA208B, MON210, REFGEN, VDA110M HD, VDA110R HD and VDA210M HD
- **Connectors:** 27 BNCs
- **Frame slots used:** 1
- **Boards in 2U:** 12 1U: 6  DTB: 2

#### RM03

- **Used for:** ADCA412, DACA214, DACA208, DADA208B and DADA208BN
- **Connectors:** 25-way standard density D-Type and 15-way standard density D-Type
- **Frame slots used:** 1
- **Boards in 2U:** 12 1U: 6  DTB: 2

#### RM04

- **Used for:** EMDEC-200
- **Connectors:** 4 BNCs and 26-way high density D-Type
- **Frame slots used:** 1
- **Boards in 2U:** 12 1U: 6  DTB: 2

#### RM11

- **Used for:** ADCA412 and DACA214
- **Connectors:** 26-way high density D-Type, 15-way standard density D-Type and BNC for A/D ref
- **Frame slots used:** 1
- **Boards in 2U:** 12 1U: 6  DTB: 2

#### RM12

- **Used for:** DACA214, DACA208, DADA208B and DADA208BN
- **Connectors:** 2 BNCs (for 75 ohm AES) and 25-way standard density D-Type
- **Frame slots used:** 1
- **Boards in 2U:** 12 1U: 6  DTB: 2

#### RM13

- **Used for:** ADCA412, DADA208, DADA208B and DADA208BN
- **Connectors:** 9 BNCs (for 75 ohm AES) and 15-way standard density D-Type
- **Frame slots used:** 2
- **Boards in 2U:** 12 1U: 6  DTB: 2

#### RM14

- **Used for:** ADCA412
- **Connectors:** 15 BNCs (for 75 ohm AES) and 3 15-way standard density D-Type
- **Frame slots used:** 4 (for 3 boards)
- **Boards in 2U:** 12 1U: 6  DTB: 2

#### RM15

- **Used for:** VDA210M HD
- **Connectors:** 12 BNCs
- **Frame slots used:** 2
- **Boards in 2U:** 6 1U: 3  DTB: 1

#### RM16

- **Used for:** DADA208, DADA208B, DADA208BN, VDA110M HD and VDA110R HD
- **Connectors:** 12 BNCs (for 75 ohm AES on DADA)
- **Frame slots used:** 2
- **Boards in 2U:** 12 1U: 6  DTB: 2

#### RM17

- **Used for:** ADCA416FM, ADCA416FR and AADA-STM-1
- **Connectors:** 44-way high density D-Type
- **Frame slots used:** 1
- **Boards in 2U:** 12 1U: 6  DTB: 2

#### RM18

- **Used for:** ALLDAC, MON210, REFGEN, VDA110M HD, VDA110R HD and VDA210M HD
- **Connectors:** 12 BNCs
- **Frame slots used:** 2
- **Boards in 2U:** 12 1U: 6  DTB: 2

#### RM21

- **Used for:** ADCA412, DACA214, DACA208B and DADA208BN
- **Connectors:** 4 BNCs (for 75 ohm AES) and 25-way standard density D-Type
- **Frame slots used:** 1
- **Boards in 2U:** 12 1U: 6  DTB: 2

More at [www.crystalvision.tv](http://www.crystalvision.tv)...
Frame rear modules continued...

RM23
Used for: ADDEC-210, ADDEC-310 and REGEN
Connectors: 6 BNCs
Frame slots used: 1
Boards in 2U: 12 1U: 6 DTB: 2

RM24
Used for: ADDEC-210 and ADDEC-310
Connectors: 27 BNCs
Frame slots used: 4 (for 3 boards)
Boards in 2U: 9

RM25
Used for: ADDEC-210 and ADDEC-310
Connectors: 27 BNCs
Frame slots used: 4 (for 3 boards)
Boards in 2U: 9

RM26
Used for: EMDCE-200
Connectors: 10 BNCs and 15-way standard density D-Type
Frame slots used: 2
Boards in 2U: 6 1U: 3 DTB: 1

RM27
Used for: ADDEC-210 and ADDEC-310
Connectors: 12 BNCs
Frame slots used: 2
Boards in 2U: 6 1U: 3 DTB: 1

RM34
Used for: Q Down123
Connectors: 6 BNCs
Frame slots used: 1
Boards in 2U: 12 1U: 6 DTB: 2

RM44
Used for: Q Down123
Connectors: 6 BNCs
Frame slots used: 1
Boards in 2U: 12 1U: 6 DTB: 2

RM45
Used for: Q Down123
Connectors: 6 BNCs
Frame slots used: 1
Boards in 2U: 12 1U: 6 DTB: 2

RM45 + RM34
Used for: Q Down183
Connectors: 12 BNCs
Frame slots used: 2
Boards in 2U: 6 1U: 3 DTB: 1

RM47
Used for: ADFP310, SYNER310 and TANDEM310
Connectors: 4 BNCs and 1 26-way high density D-Type
Frame slots used: 1
Boards in 2U: 12 1U: 6 DTB: 2

RM47 + RM46
Used for: SYNER310 and TANDEM310
Connectors: 4 BNCs, 26-way high density D-Type and 3 9-way standard density D-Types
Frame slots used: 2
Boards in 2U: 6 1U: 3 DTB: 1

RM50
Used for: LKEY 3, Safire 3 and Safire 3 Xpress
Connectors: 6 BNCs
Frame slots used: 1
Boards in 2U: 12 1U: 6 DTB: 2

2 x RM50
Used for: SWB03 3G
Connectors: 12 BNCs
Frame slots used: 2
Boards in 2U: 12 1U: 6 DTB: 2

RM52
Used for: Clip N Kay V121, Clip N Kay V121 8G, MultiLogo V132 and MultiLogo V132 8G
Connectors: 4 BNCs and 2 RJ45 connectors (with relay bypass)
Frame slots used: 1
Boards in 2U: 12 1U: 6 DTB: 2
NB: The RM52 changed in layout with the introduction of screw-in rear modules

RM52 + RM33
Used for: MultiLogo V132 and MultiLogo V132 8G
(when fitted with HD-GPIB add-on board)
Connectors: 8 BNCs, 26-way high density D-Type and 2 RJ45 connectors (with relay bypass)
Frame slots used: 2
Boards in 2U: 6 1U: 3 DTB: 1
NB: The RM52 changed in layout with the introduction of screw-in rear modules

RM52 + RM34
Used for: Clip N Kay V221, Clip N Kay V221 8G, MultiLogo V432 and MultiLogo V432 8G
Connectors: 10 BNCs and 2 RJ45 connectors (with relay bypass)
Frame slots used: 2
Boards in 2U: 6 1U: 3 DTB: 1
NB: The RM52 changed in layout with the introduction of screw-in rear modules

RM53
Used for: Smart Switch 3G and SW221 3G
Connectors: 6 BNCs
Frame slots used: 1
Boards in 2U: 12 1U: 6 DTB: 2
Everything modular: Rear modules

Frame rear modules continued...

RM54
Used for: Safe Switch 3G, Smart Switch 3G and SW221 3G
Connectors: 6 BNCs (with relay bypass)
Boards in 2U: 12 1U: 6  DTB: 1
Frame slots used: 2
Connectors: 11 BNCs and 1 optical input/output connector

RM55
Used for: FRX 3G and FTX-L 3G
Connectors: 4 BNCs and 2 optical input/output connectors
Frame slots used: 1
Boards in 2U: 12 1U: 6  DTB: 2

RM57
Connectors: 5 BNCs and 1 optical input/output connector
Frame slots used: 1
Boards in 2U: 12 1U: 6  DTB: 2

RM59 + RM46
Used for: SYNNER 310 (when fitted with a Dolby decoder option)
Connectors: 2 BNCs, 26-way high density D-Type, 1 optical input/output connector and 3 9-way standard density D-Types
Frame slots used: 2
Boards in 2U: 12 1U: 6  DTB: 1

RM60
Used for: TANDEM 310
Connectors: 2 BNCs, 26-way high density D-Type, 1 optical input/output connector
Frame slots used: 1
Boards in 2U: 12 1U: 6  DTB: 2

RM61
Used for: SYNNER 310 and TANDEM 310
Connectors: 11 BNCs (for 75 ohm AES as well as video) and 1 optical input/output connector
Frame slots used: 2
Boards in 2U: 6 1U: 3  DTB: 1

RM62
Used for: AXDELAY 3G and SYNNER 310
Connectors: 5 BNCs and 1 optical input/output connector
Frame slots used: 1
Boards in 2U: 12 1U: 6  DTB: 2

RM63
Used for: Safe Switch L 3G
Connectors: 10 BNCs and 26-way high density D-Type for 3-directional GPR connections (with relay bypass)
Frame slots used: 2
Boards in 2U: 6 1U: 3  DTB: 1

RM64
Used for: CoCo 3G
Connectors: 4 BNCs and 2 RJ45 connectors (with relay bypass)
Frame slots used: 1
Boards in 2U: 12 1U: 6  DTB: 2

RM66
Used for: Safe Switch 3G
Connectors: 5 BNCs and 1 optical output connector
Frame slots used: 1
Boards in 2U: 12 1U: 6  DTB: 2

RM67
Used for: 3GDA105C, 3GDA105N, 3GDA105R, ARC-20MC, MADDA105, SYN103, SYN 3G, SYN-A 3G, ViVid 3G, ViVid 3G-20, ViVid 3GS and ViVid 3GS-20
Connectors: 6 BNCs (with relay bypass)
Frames slots used: 2
Boards in 2U: 12 1U: 6  DTB: 2

RM70
Used for: SYNNER 310 and TANDEM 310
Connectors: 5 BNCs, 26-way high density D-Type, 1 optical input connector and 1 optical output connector
Frame slots used: 2
Boards in 2U: 6 1U: 3  DTB: 1

RM71
Used for: TANDEM 320
Connectors: 12 BNCs and 26-way high density D-Type
Frame slots used: 1
Boards in 2U: 12 1U: 6  DTB: 2

RM72
Used for: TANDEM 320
Connectors: 12 BNCs (for 75 ohm AES as well as video)
Frame slots used: 2
Boards in 2U: 1U: 3  DTB: 1

More at www.crystalvision.tv...
Frame rear modules continued...

**RM73**
- Used for: LKEY 3, Safire 3 and Safire 3 Xpress
- Connectors: 6 BNCs (with relay bypass)
- Frame slots used: 1
- Boards in 2U: 12  1U: 6  DTB: 2

**RM74**
- Used for: ADP 310, SYNNER 310 and TANDEM 310 (NB. SYNNER 310 and TANDEM 310 can either be fitted or not fitted with a Dolby decoder option)
- Connectors: 12 BNCs (for 75 ohm AES as well as video)
- Frame slots used: 2
- Boards in 2U: 6  1U: 3  DTB: 1
- NB. With the RM74 the board is placed in the lower of the two slots – unlike the other two slot high rear modules

**RM75**
- Used for: 3GDA204R
- Connectors: 6 BNCs
- Frame slots used: 1
- Boards in 2U: 12  1U: 6  DTB: 2

**RM76 + RM34**
- Used for: 3GDA210R
- Connectors: 12 BNCs (with relay bypass)
- Frame slots used: 2
- Boards in 2U: 6  1U: 3  DTB: 1

**RM77**
- Used for: LKEY SQZ
- Connectors: 6 BNCs, 9-way standard density D-Type and RJ45 (with relay bypass)
- Frame slots used: 2
- Boards in 2U: 6  1U: 3  DTB: 1
Control

You won’t believe how flexible control can be with the Indigo system. Take your pick from board edge operation on the module itself, an active front panel fitted to the front of the Indigo frame, a remote control panel placed in any convenient studio location of your choice or a dedicated control panel for the more ‘hands-on products’. Plus our GPIs are getting more and more flexible, allowing you to configure them to do just what you need. Alternatively use a web browser running on any device connected to your Ethernet network, or integrate the products into your wider control system using SNMP.

Remote control panels

VisionPanel

3U general remote control panel. Ideal for products requiring regular adjustment, with intuitive eight inch touch screen and physical controls. Can operate up to 16 frames containing any of the remote-enabled boards from the current Indigo and Vision ranges over an Ethernet network. Replaces both REMIND-E and the Safire 3 Controller.

SW808 Controller

Dedicated 1U panel for simple control of one SW803 3G routing switch. Dedicated buttons for each of the sources and destinations. Allows programming and recall of salvos. Fits easily in a control desk and is ideal for live operation and when the routing switch has regular adjustment.

CoCo 3G Controller

Dedicated 1U control panel for up to 12 CoCo 3G colour correctors and legalisers. Separate shaft encoders for the main adjustments (video gain, chroma gain, black level, RGB gain and gamma) with a display showing the value. Also allows easy adjustment of many other parameters.

VisionWeb Control

The free VisionWeb Control provides web browser operation for all remote-enabled products from the current Indigo and Vision ranges, using an attractive and intuitive user interface. Use any device on an Ethernet network that can run a web browser – from PC to tablet. Easy to arrange racks and boards using the browser’s favourites or bookmarks.

Statesman Lite

The Statesman Lite PC control software is now frozen, but for existing users is still available for download via the website. Can only be used with products from the Indigo range.

SNMP

SNMP monitoring and control is available for Crystal Vision frames and remote-enabled boards. Able to work with any SNMP manager. For SNMP monitoring, the agent can either report the status or generate traps on a status change of any board in the frame. For control, the manager can read and change the value of control settings on any board in the frame. SNMP traps can be used to trigger alarms on both status changes and control value changes, with trap filtering available. Using SNMP requires the purchase of the front panel SNMP agent and appropriate MIBs.

More at www.crystalvision.tv...
Everything modular: Control

Control software continued...

**MultiLogo Control Software**

Free software shipped with the MultiLogo logo keyer which runs on the graphics computer and allows easy board control and files conversion. Perfect for setting up keying applications in advance and very easy to use. Includes Image Converter program for conversion of different graphic formats to MultiLogo’s native file format. A simpler, cut-down version of the software is shipped with the Clip N Key clip and sting store.
Crystal Vision – because people like dealing with us

More at www.crystalvision.tv...
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