

digital keying modular
interface audio
converters analogue video

ARC102

Aspect ratio converter

USER MANUAL



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Revisions

- 1.0
- 1.1 Preset assignments corrected on page 22
- 1.2
- 1.3 GPI information added to pages 31 & 38
- 1.4 Recall with GPIs information updated for software revision 2.54 onwards

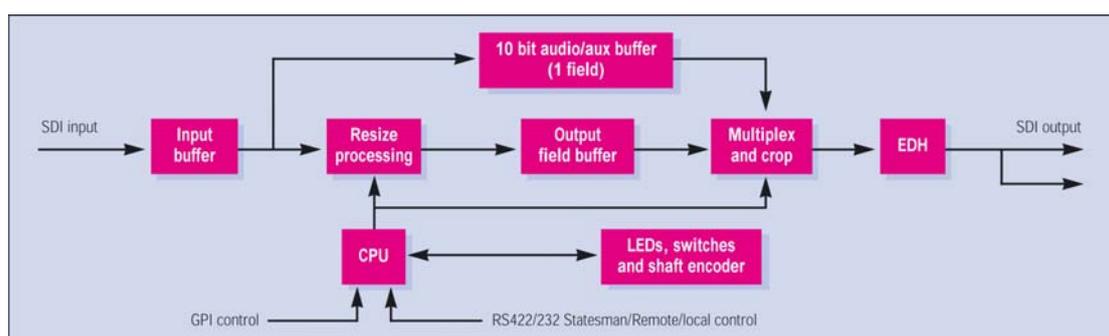
1 Introduction

The ARC102 is a digital aspect ratio converter for 625/525 SDI video.

Two main operational modes are available: preset mode and user mode. In preset mode, 7 factory presets are available. Three presets convert from a 16:9 input video aspect ratio to a 4:3 output aspect ratio and three presets convert from a 4:3 input video aspect ratio to a 16:9 output aspect ratio. The six factory presets provide a balance between picture loss and black bars whilst preserving picture geometry. The remaining preset passes the incoming video unconverted.

The output picture can be cropped in both user and fixed modes. In user mode, the aspect ratio and the image position is continuously variable. Up to eight user set-ups can be stored and recalled.

The ARC102 is controllable from board edge, Statesman or from local or remote panels. GPI selection of both factory and user presets is also provided.



ARC102 Aspect Ratio Converter

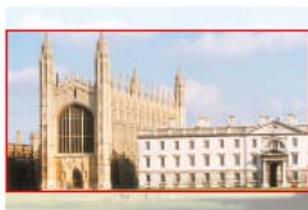
The main features are as follows:

- 8 bit digital aspect ratio converter
- 100mm x 266mm module allows 12 ARC102s in 2U
- 6 factory presets and 8 user defined presets
- Continuous horizontal and vertical compression and expansion
- Horizontal and vertical offsets of picture
- Vertical and horizontal cropping
- EDH generation
- GPI selection of presets
- Passes 10 bit embedded audio or data with same delay as picture
- Card edge, active/remote panel and Statesman control options

Horizontal and vertical offsets of the picture allow, for example, the easy addition of subtitles, whilst unlimited vertical and up to 255 horizontal luminance pixel cropping is provided for cleaning up the edges of the picture and removing unwanted material.

There is automatic 625/525 line standard detection and EDH can be added to the output. Embedded digital audio and 10-bit ancillary data is passed through unprocessed. There is a fixed propagation delay of one field between input data and output data.

4:3 to 16:9



4:3 Full Screen

Full 4:3 source width mapped to 16:9 monitor width
 Central 75% of source height stretched to monitor height
 No vertical black bands required
 Significant picture lost

16:9 to 4:3



16:9 Full Screen

Central 75% of 16:9 source width stretched to 4:3 monitor width
 Full source height mapped to monitor height
 No horizontal black bands required
 Significant picture lost



14:9 Pillarbox

Full 4:3 source width compressed to central 87.5% of 16:9 monitor width
 Central 87.5% of source height stretched to monitor height
 Vertical black bands added to left and right
 Minimal picture lost



14:9 Letterbox

Central 87.5% of 16:9 source width stretched to 4:3 monitor width
 Full source height compressed to 87.5% of monitor height
 Horizontal black bands added to top and bottom
 Minimal picture lost



4:3 Pillarbox

Full 4:3 source width compressed to central 75% of 16:9 monitor width
 Full source height mapped to monitor height
 Vertical black bands added to left and right
 No picture lost



16:9 Letterbox

Full 16:9 source width mapped to 4:3 monitor width
 Full source height compressed to 75% of monitor height
 Horizontal black bands added to top and bottom
 No picture lost

ARC102 Factory Presets 1-6

The ARC102 is a 100mm x 266mm module, which fits in the three standard frames and can be integrated with any boards from the company's full product range. It uses the RM01 single height rear connector and the RM02 triple height rear connector when used in a FR2AV or 2U Indigo frame.

2 Installing Statesman

The Crystal Vision Statesman PC control software is designed to control a range of Crystal Vision modules via serial control from a PC. Statesman provides a user friendly means of configuring and operating the ARC102 with the benefit of see-at-a-glance status monitoring. Most functions can be accessed from Statesman menus.

The main Statesman application communicates with each module in a frame through an active control panel. An active panel must be fitted to allow for Statesman control.

Minimum pre-requisites:

- A PC running Windows 98, NT4 with SP 5 or higher Windows 2000 or Windows XP
- A parallel port dongle supplied with the Statesman software package
- An RS422 serial connection from the host PC to the Remote 2 connector on an FR1AV or FR2AV Crystal Vision frame with at least one ARC102 module and/or other Statesman compatible module
- An active control panel **MUST** be fitted to the frame with version 1.50 or above firmware
- An optional RS422 to RS232 converter if the PC has no RS422 ports

Installing Statesman

- Refer to the readme and/or help file on the CD before proceeding
- To view all application windows, set graphics resolution to at least 1024 x 768
- Remove any previous version of the Statesman software using the Add/Remove Programs application in the Windows Control Panel
- Ensure that the Statesman dongle is fitted to the parallel port of the host PC
- Insert the Statesman CD and the installation should start immediately – if it does not, run the setup.exe file on the CD
- Obey any installation program prompts and restart the PC when prompted

Running Statesman for the first time

The Statesman PC Control System may be run from the Crystal Vision programs folder via the Start menu or by double-clicking on the Crystal Vision.exe file in the installed program directory.

When the program runs it will require licence information and an administrator name and password. It will also need to know which computer port is being used to connect to a Crystal Vision frame(s).

Note: For further details of Statesman configuration please refer to the Statesman manual.

3 Statesman operation

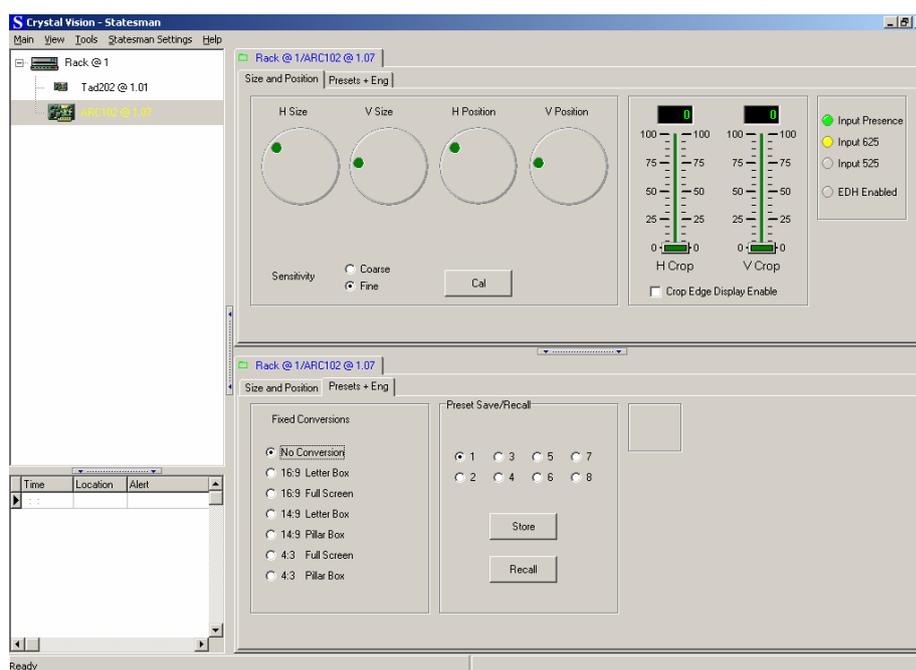
Once Statesman is configured it should automatically detect any statesman compatible modules in the connected frame or frames and display them in the main application left hand explorer-style window.

Open any frame by clicking on the '+' sign or by double clicking on a frame. Installed modules should be shown with module icons. Frame and module icons can be named as desired by right-clicking or using the edit menu and choosing rename.

To aid user recognition of module and frame status quickly, the following colour and size coding is used:

- A module is shown present by full colour and absent by greyed colour
- A module is shown open by large icon size and closed by small icon
- A module is the source of an active alarm if red and not alarmed if green

Double-clicking on a module will enable the display of the main application menus.



Statesman main application window

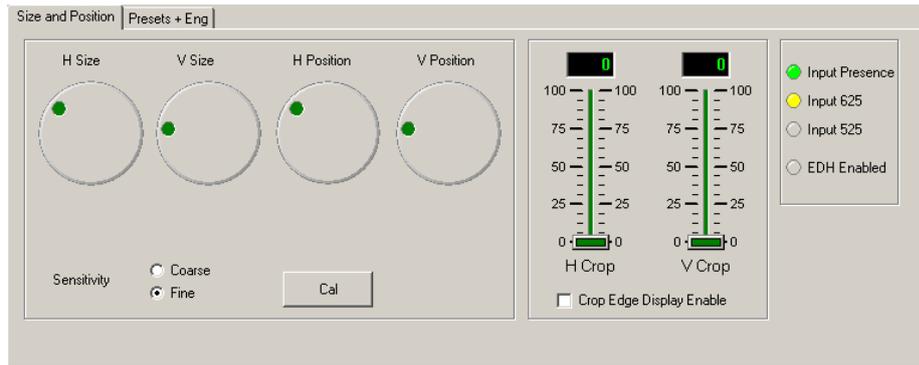
The two large control panes shown in the upper and lower halves of the window may display different menus for the same card, or controls for different cards. Click on the horizontal button-bar between the two panes to close the lower plane or drag the button to vary the size of the panes.

Note: For further details of Statesman configuration and operation please refer to the Statesman manual.

3.1 Controlling image size and cropping

The size and position tab provides access to the following user controls

- Variable horizontal and vertical size and position
- Variable vertical and horizontal picture cropping



Size, position and cropping controls

Size

Click with the mouse in the horizontal size trackball to vary horizontal size by -50% to $+200\%$ giving a possible horizontal expansion of between half and twice original size. Horizontal size is varied with respect to the left picture edge, only the right edge moves

Click with the mouse in the vertical size trackball to vary vertical size between -50% and $+200\%$ giving a possible vertical expansion of between half and twice original size. Vertical size is varied with respect to the top picture edge, only the bottom edge moves.

Use the coarse or fine check boxes to vary the control sensitivity. Press the CAL button to calibrate the horizontal and vertical size and position to 100% with no cropping.

Position

Click with the mouse in the horizontal position trackball to vary horizontal position and click with the mouse in the vertical position trackball to vary vertical position.

Use the coarse or fine check boxes to vary the control sensitivity. Press the CAL button to calibrate the horizontal and vertical size and position to 100% with no cropping.

The picture width and height adjustments range from 50% to 200% . The horizontal and vertical offsets range from -100% to 100% . When the image width and/or height image size is greater than 100% and the offset is negative, the operator can scan over the input image. When the image width and height is less than 100% and the offset is positive, the operator can pan over the input image.

Tip: The position controls are interactive with the size controls and some values are not permissible. If the position or size controls do not work as expected, try recalling a no conversion fixed preset as a starting point. Values may be different in remote mode and local mode and are retained through power down, and restored when the unit is powered up.

Picture cropping

Horizontal and vertical crop can be added to the displayed image by using the crop sliders.

The amount of horizontal and vertical cropping is shown in green if the 'Crop Edge Display Enable' box is checked. This helps to show the amount of crop that will be used.

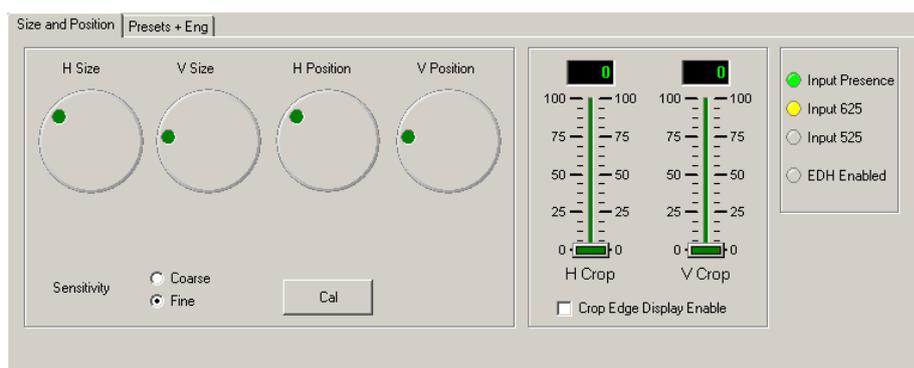
Crop settings are stored automatically and remain static during user picture size adjustment.

To set crop values to the default value of zero right click on a slider and choose calibrate.

Status

The Size and Position tab provides access to the following status information

- Input presence/standard
- EDH status



Size, position and cropping control

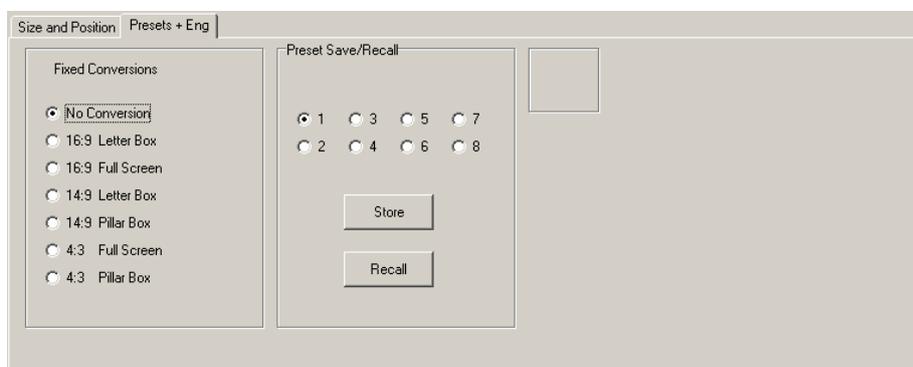
The following table summarises the status indicators and the colours used:

Indicator	Colour and status
Input presence	Green: input present
	Red: input absent
Input 625	Yellow: 625 input detected
	Grey: 625 not detected
Input 525	Yellow: 525 input detected
	Grey: 525 not detected
EDH enabled	Yellow: enabled
	Grey: disabled

Note: EDH refers to the addition of EDH to the output and can only be enabled at the card edge.

3.2 Fixed conversions and presets

The Presets and Eng tab provides access to fixed conversions.



Fixed Conversion (left pane)

Fixed aspect ratio presets

The No Conversion preset passes the source signal without any conversion.

Letter Box and 16:9 Full Screen presets convert a signal generated by a 16:9 source so that it can be viewed on a 4:3 monitor with the geometry preserved.

Pillar Box and 4:3 Full Screen presets convert a signal generated by a 4:3 source so that it can be viewed on a 16:9 monitor with the geometry preserved.

Preset	Input Aspect	Output Aspect	Aspect	Size
No Conversion	16:9/4:3	4:3/16:9	1.000	1.000
16:9 Letter Box	16:9	4:3	1.333	0.750
16:9 Full Screen	16:9	4:3	1.333	1.000
14:9 Letter Box	16:9	4:3	1.333	0.857
14:9 Pillar Box	4:3	16:9	0.750	1.167
4:3 Full Screen	4:3	16:9	0.750	1.333
4:3 Pillar Box	4:3	16:9	0.750	1.000

16:9 Letter Box converts the 16:9 source so the full source width is mapped to the 4:3 monitor width. The full source height is compressed to 75% of the output monitor height to preserve the picture geometry. Horizontal black bands are added to the top and bottom of the output picture.

16:9 Full Screen converts the 16:9 source so that the central 75% of the source width is stretched to fit the full 4:3 monitor width. The source height does not need to be compressed to preserve the picture geometry and no horizontal black bands are added to the output picture.

14:9 Letter Box converts the 16:9 source so that the central 87.5% of the source width is stretched to fit the full 4:3 monitor width. The full source height is compressed to 87.5% of the output monitor height to preserve the picture geometry. Horizontal black bands are added to the top and bottom of the output picture.

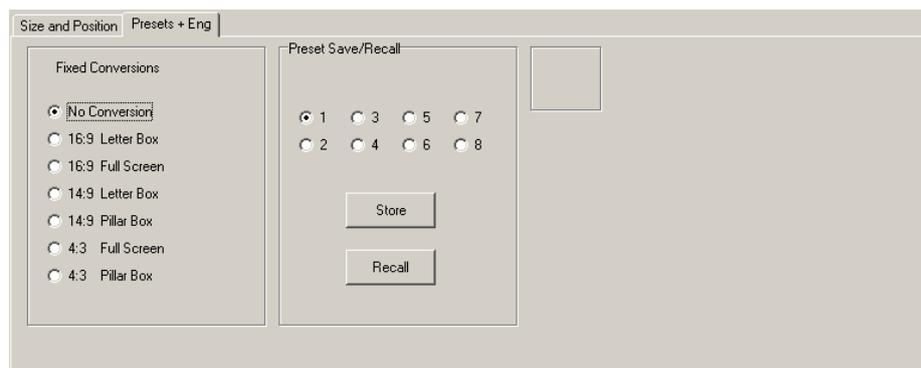
14:9 Pillar Box covers the 4:3 source so that the full source width is compressed to the central 87.5% 16:9 monitor width and corresponding vertical black bands are added to the left and right of the output picture. The central 87.5% of the source height is taken and stretched to the full monitor height to preserve the picture geometry.

4:3 Full Screen converts the 4:3 source so that the full source width is mapped to the 16:9 monitor width and no vertical black bands are added to the output picture. The central 75% of the source height is taken and stretched to the full monitor height to preserve the picture geometry.

4:3 Pillar Box converts the 4:3 source so that the full source width is compressed to the central 75% 16:9 monitor width and corresponding vertical black bands are added to the left and right of the output picture. The full source height is taken and mapped to the full monitor height to preserve the picture geometry.

3.3 Saving and recalling presets

The Presets and Eng tab provides access to presets.



Preset Save/Recall (middle pane)

To save the currently displayed picture parameters select a preset and click save.

To restore a saved preset, select the preset and click restore.

The card-edge WRITE LED will briefly illuminate to confirm the save action.

4 Using the active control panel

This operational guide assumes that the panel has been setup according to the Panel setup procedure described in the Crystal Vision Controls Panel manual.

Note: It is **ESSENTIAL** that the Panel setup procedure is followed and any old or unknown passwords cleared prior to using the panel for the first time.

At power up, the two line 20-character screen will display 'Crystal Vision' followed by the firmware version number for the control panel. All eight control panel key LEDs will illuminate.



The Crystal Vision control panel start up display

'Control Panel' then briefly replaces the version number display.



If the control panel firmware has been updated for Statesman control (version 1.5.0 or higher), Statesman Mode will be entered and the message, 'Press CAL to Exit' will be displayed and the CAL LED will light.



Statesman mode is entered by default

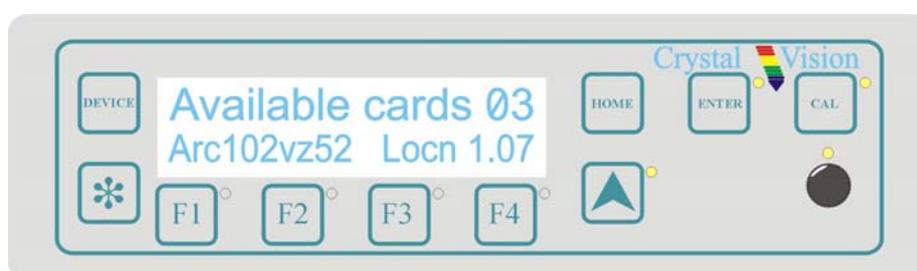
To continue with control panel operation or configuration, press the 'CAL' key once. A second press of the 'CAL' key will return to Statesman control.

The control panel will display the name of the card that first responds to the polling request together with its location number.

The location number consists of the frame number plus the card position in the frame.

Selecting the ARC102

To select a particular card in a frame, press the DEVICE key to go to the Device menu. The top line of the display will show 'Available Cards X', where X is the number of cards that have responded so far to the polling request.



Device menu showing available cards

Rotate the shaft encoder and the bottom row will display the successfully polled cards by name and location or slot number.

In the example above, the card displayed is located in the first frame in slot number 12.

When the desired card is selected press the ENTER key to access that card's HOME menu.

If remote control has been enabled, the control panel will then enter card mode and communicate with the ARC102 at the node number last displayed in the available cards list. If the card is in local mode, 'Remote Ctrl Disabled' will be displayed.



The ARC102 home menu

Note: The ARC102 will need to have the card edge local/remote switch (lever 8) in the DOWN position to enable active or remote control panel operation. Refer to the Card edge operation chapter or Installation chapter for more information.

Navigating the display

The functions assigned to control panel keys are dependent on the card selected for control, and the panel mode. The following list illustrates the functions when controlling an ARC102.

- DEVICE – enters Device menu to select a card or card to control / enter Panel setup when held down during power up / shows frame status when pressed from Statesman mode
- CAL – Enter or leave Statesman mode / enter panel diagnostics mode when held down during power up
- Asterisk – enters board rename menu from the Device menu
- F1 to F4 – soft keys, function assigned within each menu
- HOME – moves the display to the home menu
- ENTER – accept current selection
- Upward arrow – used to move up the menu structure / enter lock panel menu from the Device menu
- Rotary control – shaft encoder used to select options or variable data

Note: Please refer to the Crystal Vision Control Panel manual for details of the Panel Setup, Lock Panel and Diagnostic menus.

Using the shaft encoder

The shaft encoder function is dependent on the menu currently active. In general in top level menus the shaft encoder is used to cycle through settings or functions to adjust. Once the desired gain or alarm setting is displayed, pressing the Enter key will allow the shaft encoder to change the assigned value for that setting or function.

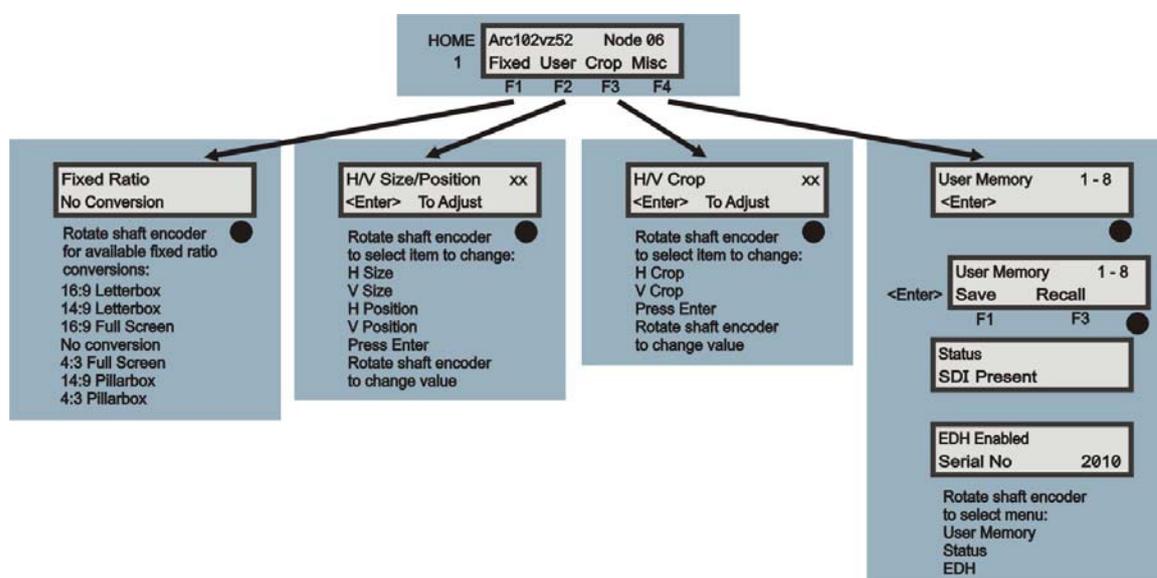
The Enter key must be pressed again to leave the data assignment mode and to continue navigating the menu.

4.1 The ARC102 active panel menu structure

The main top-level menus for the ARC102 module are obtained by pressing the F1, F2, F3 and F4 keys from that module's HOME menu. Menu keys are illuminated when active and when further menus are available. The four top-level menus are:

- Fixed aspect ratio conversions – press F1
- Variable aspect ratio conversion – press F2
- Picture cropping – press F3
- Misc – User memories, and status - press F4

The following chart shows the available menus.



The ARC102 menu tree

Note: Function keys and shaft encoder LEDs are illuminated when active. Menus associated with the shaft encoder for changing assigned values are shown with a black circle.

Shorthand codes

The following shorthand codes are used in active control panel menus:

Menu code	Function description
EDH	Error Detection and Handling
SDI	Serial Digital Interface
GPI	General Purpose Interface (also General Purpose Input)
GPO	General Purpose Output

4.2 Selecting fixed aspect ratios

Pressing F1 from the home menu will display the Fixed ratio menu.

Fixed aspect ratio menu	Description
	<p>Rotate the shaft encoder to select a fixed ratio conversion from the seven available:</p> <ul style="list-style-type: none"> 16:9 Letterbox 14:9 Letterbox 16:9 Full Screen No conversion 4:3 Full Screen 14:9 Pillarbox 4:3 Pillarbox <p>The selected ratio is effective the moment it is displayed.</p>

Note: The effective aspect ratio may be different in remote mode and local mode and are retained through power down, and restored when the unit is powered up.

Fixed aspect ratio presets

Letter Box and 16:9 Full Screen presets convert a signal generated by a 16:9 source so that it can be viewed on a 4:3 monitor with the geometry preserved.

The No Conversion preset passes the source signal without any conversion.

Pillar Box and 4:3 Full Screen presets convert a signal generated by a 4:3 source so that it can be viewed on a 16:9 monitor with the geometry preserved.

Preset	Input Aspect	Output Aspect	Aspect	Size
16:9 Letter Box	16:9	4:3	1.333	0.750
14:9 Letter Box	16:9	4:3	1.333	0.857
16:9 Full Screen	16:9	4:3	1.333	1.000
No Conversion	16:9/4:3	4:3/16:9	1.000	1.000
4:3 Full Screen	4:3	16:9	0.750	1.333
14:9 Pillar Box	4:3	16:9	0.750	1.167
4:3 Pillar Box	4:3	16:9	0.750	1.000

16:9 Letter Box converts the 16:9 source so the full source width is mapped to the 4:3 monitor width. The full source height is compressed to 75% of the output monitor height to preserve the picture geometry. Horizontal black bands are added to the top and bottom of the output picture.

14:9 Letter Box converts the 16:9 source so that the central 87.5% of the source width is stretched to fit the full 4:3 monitor width. The full source height is compressed to 87.5% of the output monitor height to preserve the picture geometry. Horizontal black bands are added to the top and bottom of the output picture.

16:9 Full Screen converts the 16:9 source so that the central 75% of the source width is stretched to fit the full 4:3 monitor width. The source height does not need to be compressed to preserve the picture geometry and no horizontal black bands are added to the output picture.

4:3 Full Screen converts the 4:3 source so that the full source width is mapped to the 16:9 monitor width and no vertical black bands are added to the output picture. The central 75% of the source height is taken and stretched to the full monitor height to preserve the picture geometry.

14:9 Pillar Box converts the 4:3 source so that the full source width is compressed to the central 87.5% 16:9 monitor width and corresponding vertical black bands are added to the left and right of the output picture. The central 87.5% of the source height is taken and stretched to the full monitor height to preserve the picture geometry.

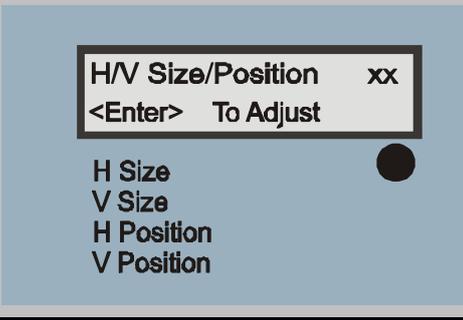
4:3 Pillar Box converts the 4:3 source so that the full source width is compressed to the central 75% 16:9 monitor width and corresponding vertical black bands are added to the left and right of the output picture. The full source height is taken and mapped to the full monitor height to preserve the picture geometry.

4.3 Creating user ratios

Pressing F2 from the home menu will display the variable aspect ratio menu.

The following settings can be adjusted:

- Horizontal size
- Vertical size
- Horizontal position
- Vertical position

Creating user ratio menu	Description
	<p>Rotate the shaft encoder to select a variable to change from the four available: H Size, V Size, H Position and V Position Press the Enter key to enter data change mode for the selected variable, then rotate the shaft encoder to change the assigned value 'xx' Press the Enter key to leave data change mode and return to menu navigation</p>

The picture width and height adjustments range from 50% to 200%. The horizontal and vertical offsets range from -100% to 100%. When the image width and/or height image size is greater than 100% and the offset is negative, the operator can scan over the input image. When the image width and height is less than 100% and the offset is positive, the operator can pan over the input image.

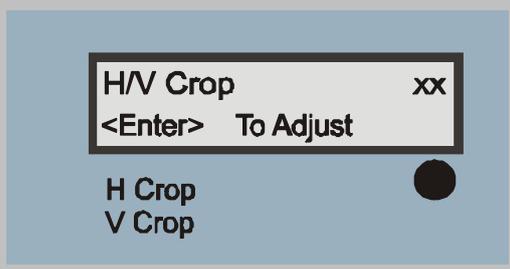
Note: The position controls are interactive with the size controls and some values are not permissible. If the position or size controls do not work as expected, try recalling a no conversion fixed preset as a starting point.
Values may be different in remote mode and local mode and are retained through power down, and restored when the unit is powered up.

4.4 Cropping the output picture

Pressing F3 from the home menu will display the crop menu.

The following settings can be adjusted:

- Horizontal crop
- Vertical crop

Crop menu	Description
	<p>Rotate the shaft encoder to select a variable to change from the two available: H Crop, V Crop</p> <p>Press the Enter key to enter data change mode for the selected variable, then rotate the shaft encoder to change the assigned value 'xx'.</p> <p>Press the Enter key to leave data change mode and return to menu navigation</p>

The picture area cropped by the crop adjustment is highlighted in green whilst the crop menu is active. To save the crop setting and turn off the crop highlight leave the menu by pressing Enter.

Note: Values ranges are:

H Crop: 0% to 100%

V Crop: 0% to 100%

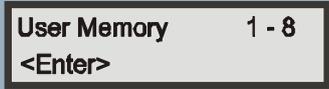
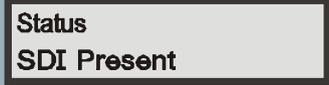
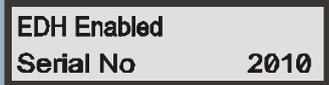
These values may be different in remote mode and local mode and are retained through power down, and restored when the unit is powered up.

4.5 User memories and status

Pressing F4 from the home menu will display the miscellaneous menu.

The following can be accessed:

- User memories
- SDI status
- EDH status and module serial number

Miscellaneous menu	Description
	<p>Select user memory from 1 to 8 Press the ENTER key when the desired user memory is displayed to enter data-entry mode.</p>
	<p>Press F1 to save the current aspect ratio/crop values or F3 to recall previously saved settings. Press ENTER again to leave the data-entry mode and continue navigating the available menus.</p>
	<p>Show current status - e.g. SDI Present/Missing It is not necessary to press ENTER</p>
	<p>EDH status Module serial number</p>

Note: EDH transmission can only be disabled or enabled at the card edge.

Saving and recalling presets

To save the currently displayed picture parameters select a preset and click save.

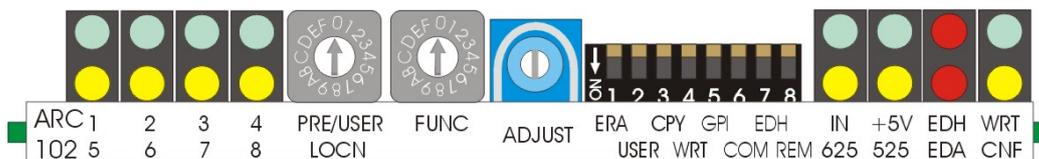
To restore a saved preset, select the preset and click recall.

The card-edge WRITE LED will briefly illuminate to confirm the save action.

5 Card edge operation

Once the start-up initialisation procedure is complete, the ARC102 can be controlled or configured from the card edge, the active control panel or the Statesman PC interface. This chapter will concentrate on the card edge controls.

The front edge of the card provides power rail monitoring, full configuration control and user memory save and recall controls.



ARC102 front edge view

Status indication

LED Colour	Label	Status When ON
Green	IN	Valid input detected
Green	+5V	Supply Voltage present
Red	EDH	Error detected here
Green	WRT	User memory location being updated
Yellow	625	625 line input detected
Yellow	525	525 lines input detected
Red	EDA	Error detected already
Yellow	CNF	Board undergoing configuration

5.1 Using the 8-way switch controls

The 8-way piano switch levers are assigned the following functions:

Lever	UP	DOWN	Default
DIP 1	Disable memory erase	Erase user memories on power up	Up
DIP 2	Preset Mode	User Mode	Up
DIP 3	Copy Mode Off	Copy Mode On	Up
DIP 4	Memory Write Disabled	Memory Write Enabled	Up
DIP 5	Hex switch controls preset/user memory control	GPI controls preset/user memories	Up
DIP 6	Master Rack (using remote control)	Slave Rack (using remote control)	Up
DIP 7	No EDH transmitted	EDH Transmitted	Up
DIP 8	Remote Control Mode	Local Control Mode	Down

8-Way piano switch menu functions

Local/remote settings

The following card-edge controls affect the use of the module in both local and remote operation.

Memory Erase

To recall default values for all 8 user memory areas set lever 1 in the down position and apply power. These default values pass the input video without conversion.

GPI memory control

To allow GPI inputs to control the preset or user memory location in local control mode selection set lever 5 in the DOWN position. If the lever 5 is in the UP position then the LOCATION rotary switch controls the memory location.

Using a two rack, master/slave setup

To set the address of a card as a slave set lever 6 in the DOWN position. This enables two Arc 102 cards to be set in the same position in both the master and slave racks in two rack configurations.

EDH

To allow EDH to be added to the output video data set lever 7 in the down position. When lever 7 in the up position no EDH is added.

Remote/Local Control

When lever 8 is set in the down position control is local so that card-edge rotary switches and the shaft encoder control aspect ratio selection and adjustment respectively. When lever 8 is in the up position, control is serial remote control and local control is disabled. Jumpers as explained in the Installation chapter select RS232 or RS422 serial control.

Serial control is required for the Crystal Vision Active Remote Control Panel FP1 or FP2, and Statesman. Note that for GPI control this switch needs to be in the local position.

Local only settings

The following card-edge controls affect the use of the module in local operation only:

Preset mode selection

In local mode with lever 2 in the UP position preset mode is engaged and the preset aspect ratio conversions can be used.

To select the 8 available presets rotate the PRE/USER LOCATION switch clockwise.

Card edge fixed aspect ratio presets

Presets 1, 2 and 3, (Letter Box and 16:9 Full Screen) convert a signal generated by a 16:9 source so that it can be viewed on a 4:3 monitor with the geometry preserved.

The No Conversion presets 4 and 5 passes the source signal without any conversion.

Presets 6,7 and 8 (4:3 full screen and Pillar Box) convert a signal generated by a 4:3 source so that it can be viewed on a 16:9 monitor with the geometry preserved.

Presets	Input Aspect	Output Aspect	Aspect	Size	Description
1	16:9	4:3	1.333	0.750	16:9 Letter Box
2	16:9	4:3	1.333	0.857	14:9 Letter Box
3	16:9	4:3	1.333	1.000	16:9 Full Screen
4	16:9	4:3	1.000	1.000	No Conversion
5	4:3	16:9	1.000	1.000	No Conversion
6	4:3	16:9	0.750	1.333	4:3 Full Screen
7	4:3	16:9	0.750	1.167	14:9 Pillar Box
8	4:3	16:9	0.750	1.000	4:3 Pillar Box

Preset 1 converts the 16:9 source so the full source width is mapped to the 4:3 monitor width. The full source height is compressed to 75% of the output monitor height to preserve the picture geometry. Horizontal black bands are added to the top and bottom of the output picture.

Preset 2 converts the 16:9 source so that the central 87.5% of the source width is stretched to fit the full 4:3 monitor width. The full source height is compressed to 87.5% of the output monitor height to preserve the picture geometry. Horizontal black bands added to the top and bottom of the output picture.

Preset 3 converts the 16:9 source so that the central 75% of the source width is stretched to fit the full 4:3 monitor width. The source height does not need to be compressed to preserve the picture geometry and no horizontal black bands are added to the output picture.

Preset 6 converts the 4:3 source so that the full source width is mapped to the 16:9 monitor width and no vertical black bands are added to the output picture. The central 75% of the source height is taken and stretched to the full monitor height to preserve the picture geometry.

Preset 7 converts the 4:3 source so that the full source width is compressed to the central 87.5% 16:9 monitor width and corresponding vertical black bands are added to the left and right of the output picture. The central 87.5% of the source height is taken and stretched to the full monitor height to preserve the picture geometry.

Preset 8 converts the 4:3 source so that the full source width is compressed to the central 75% 16:9 monitor width and corresponding vertical black bands are added to the left and right of the output picture. The full source height is taken and mapped to the full monitor height to preserve the picture geometry.

Preset memory indication

Preset Mode	LED Status
Preset 1	LED 1 with LED 8
Preset 2	LED 2 with LED 8
Preset 3	LED 3 with LED 8
Preset 4	LED 4 with LED 8
Preset 5	LED 1 with LED 5
Preset 6	LED 2 with LED 5
Preset 7	LED 3 with LED 5
Preset 8	LED 4 with LED 5

User mode adjustment

In local mode with lever 2 in the DOWN position user mode is engaged and user input and output aspect ratios can be defined using the FUNC rotary switch as shown in the following table:

SWITCH VALUE	FUNCTION
0	Image Width
1	Image Horizontal Offset
2	Image Height
3	Image Vertical Offset
4	Vertical Crop
5	Horizontal Crop

The value is modified by rotating the ADJUST shaft encoder clockwise to increase the value or by rotating anti-clockwise to decrease the value.

Image Adjustments

The picture width and height adjustments range from 50% to 200%. The horizontal and vertical offsets range from -100% to 100%. When the image width and/or height image size is greater than 100% and the offset is negative, the operator can scan over the input image. When the image width and height is less than 100% and the offset is positive, the operator can pan over the input image.

If the position or size controls do not work as expected, try recalling a no conversion fixed preset as a starting point.

Picture Cropping

During adjustment the horizontal and vertical cropping amount is visible. Setting the Function Hex switch to 4 for Vertical crop adjustment or 5 for Horizontal crop adjustment highlights the amount of cropping on screen in Green. When the crop amount is satisfactory, setting the Function Hex switch to any value other than 4 or 5 will turn the crop highlighting off and leave the crop amount fixed as black. The use of crop highlighting shows the amount of crop that will be used.

Crop settings are stored when written to a user memory. They remain static during user picture size adjustment. Crop can be added to a preset by first copying the preset to a user memory.

Copying

This enables a preset or a user memory to be copied into another user memory. Select the preset or user memory that has the required settings to be copied. Setting lever 3 in the down position will hold the settings of the current picture set up. Select User mode if not already in it and then select the user memory location required for storage. These values can be modified or written into the user memory by use of WRITE lever 4.

Writing to a User Memory

When lever 4 is set DOWN and then UP again, any current settings will immediately be written to the non-volatile user memory location set by the LOCATION rotary switch. The WRITE LED will briefly illuminate to confirm this process.

User memory indication

USER Mode	LED Colour	LED Number
User memory 1	Green	1
User memory 2	Green	2
User memory 3	Green	3
User memory 4	Green	4
User memory 5	Yellow	5
User memory 6	Yellow	6
User memory 7	Yellow	7
User memory 8	Yellow	8

6 Hardware installation

The ARC102 aspect ratio converter fits into all Crystal Vision rack frames. All modules can be plugged in and removed while the frame is powered without damage.

6.1 Rear modules and signal I/O

FR2AV, FR1AV & DTBAV rear connector

The 2U FR2AV frame will house up to 12 modules and dual power supplies. The 1U FR1AV frame will house 6 modules and a single power supply. The DTBAV 1U high Desk Top Box has built-in power supply and will house up to 2 modules.

On the FR2AV and FR1AV frames a hinged front panel gives access to the PSU and all modules. The DTBAV has a removable front. The universal frame wiring system allows any of the interface range of modules to be fitted in any position with the use of removable rear modules.

The modules can be plugged in and removed while the frame is powered without damage.

The ARC102 is used with the RM01 single slot rear connector which allows up to 12 such modules, in any mix in an FR2AV frame and the RM02 triple height rear connector which allows up to 9 modules in a FR2AV frame.

Rear module connections with RM01:

With ZLA00077 artwork

RM01 fits in FR2AV, FR1AV & DTBAV frames		Description
		RM01 (ZLA00077 artwork) <ul style="list-style-type: none"> • 12 modules per FR2AV, 6 per FR1AV & 2 per DTBAV frame • All frame slots can be used
BNC	Signal	
SDI IN	Serial Digital Input	
SDI OUT 1	Serial Digital Output 1	
SDI OUT 2	Serial Digital Output 2	

RM01 with generic artwork

If an RM01 rear connector with generic names is used the pinout is as follows:

General Label Name (ZLA00073)	Description
SDI/1	Serial Digital input
SD2	Not Used
Y/G/OPA	Serial Digital output 1
U/B/OPB	Serial Digital output 2
V/R/OPC	Not Used
SYNC/OPD	Not Used

Rear module connections with RM02:

RM02 fits in FR2AV frame	Description
	<p>RM02</p> <ul style="list-style-type: none"> • 9 modules per FR2AV frame • 3 modules per rear connector • 9 connections available • Card 1 fits in slots 1, 5 and 9 • Card 2 fits in slots 2, 6 and 10 • Card 3 fits in slots 4, 8 and 12 • No card fits in 3, 7 or 11

BNC	Signal
IN	Serial Digital Input.
1	Not Used
2	Serial Digital output 1
3	Not Used
4	Serial Digital output 2
5	Not Used
6	Not Used
7	Not Used
8/IN2	Not Used

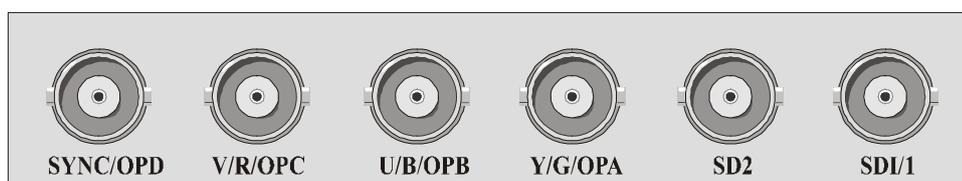
For details of fitting rear connectors please refer to the appropriate frame manual.

FR1-6, FR2-12 and FR2-8 frame rear connectors

The 1U FR1-6 frame for 6 modules includes rear panel BNC connections and plug-in power supply. A hinged front panel gives access to the PSU and all modules. The universal frame wiring system allows any of the interface range of modules to be fitted in any position. The 2U FR2-12 frame houses up to 12 modules and dual power supplies. The 2U FR2-8 frame houses 8 modules each with extra rear panel BNC connections.

The modules can be plugged in and removed while the frame is powered without damage.

FR1-6 & FR2-12 rear connectors



FR1-6 & FR2-12 connections

BNC	Description
SDI/1	Serial Digital input
SD2	Not Used
Y/G/OPA	Serial Digital output 1
U/B/OPB	Serial Digital output 2
V/R/OPC	Not Used
SYNC/OPD	Not Used

FR2-8 connections

BNC	Description
SDI/1	Serial Digital Output (1).
SD2	Serial Digital Output (2)
Y/G/OPA	Analogue Composite Video or C input.
Y/G/OPA(2)	Not used, connected to frame ground
U/B/OPB	Analogue Y plus sync input (active in Y/C input mode only)
U/B/OPB(2)	Not used, connected to frame ground
V/R/OPC	TTL pulse output for audio follow delay
V/R/OPC(2)	Composite Sync Loop through (set by J1).
SYNC/OPD	Composite Sync (B & B) input
SYNC/OPD(2)	Not used

6.2 Frame GPI connections

FR2AV GPI Connections

GPI lines 'a' to 'f' of each card connect to one of four rear remote connectors as follows:

Slot no.	'a' pin	'b' pin	'c' pin	'd' pin	'e' pin	'f' pin
1	8 (1)	9 (1)	18 (1)	26 (1)	19 (2)	20 (2)
2	7 (1)	16 (1)	17 (1)	25 (1)	10 (2)	11 (2)
3	8 (3)	9 (3)	18 (3)	26 (3)	19 (4)	20 (4)
4	7 (3)	16 (3)	17 (3)	25 (3)	10 (4)	11 (4)
5	5 (1)	6 (1)	15 (1)	24 (1)	1 (2)	2 (2)
6	4 (1)	14 (1)	13 (1)	23 (1)	3 (2)	4 (2)
7	5 (3)	6 (3)	15 (3)	24 (3)	1 (4)	2 (4)
8	4 (3)	14 (3)	13 (3)	23 (3)	3 (4)	4 (4)
9	3 (1)	12 (1)	22 (1)	21 (1)	12 (2)	13 (2)
10	10 (1)	11 (1)	19 (1)	20 (1)	21 (2)	22 (2)
11	3 (3)	12 (3)	22 (3)	21 (3)	12 (4)	13 (4)
12	10 (3)	11 (3)	19 (3)	20 (3)	21 (4)	22 (4)

Table shows Pin number (Remote number)

Note: Remote 1 and Remote 3 are 26 way high density 'D' type female sockets and frame ground is pin 2 and +5V @500mA is pin 1 in each case.
Remote 2 and Remote 4 are 26 way high density 'D' type male plugs and frame ground is pin 6 and +5V @500mA is pin 15 in each case.

FR1AV GPI connections

GPI lines 'a' to 'f' of each card connect to one of two rear remote connectors as follows:

Slot no.	'a' pin	'b' pin	'c' pin	'd' pin	'e' pin	'f' pin
1	8 (1)	9 (1)	18 (1)	26 (1)	19 (2)	20 (2)
2	7 (1)	16 (1)	17 (1)	25 (1)	10 (2)	11 (2)
3	5 (1)	6 (1)	15 (1)	24 (1)	1 (2)	2 (2)
4	4 (1)	14 (1)	13 (1)	23 (1)	3 (2)	4 (2)
5	3 (1)	12 (1)	22 (1)	21 (1)	12 (2)	13 (2)
6	10 (1)	11 (1)	19 (1)	20 (1)	21 (2)	22 (2)

Table shows Pin number (Remote number)

Note: Remote 1: 26 way high density D-type socket. Frame ground is pin 2 and +5V @500mA is pin 1.
Remote 2: 26 way high density D-type plug. Frame ground is pin 6 and +5V @500mA is pin 15.

DTB-AV GPI connections

GPI lines 'a' to 'f' of each card connect to the rear remote connector as follows:

Slot no.	'a' pin	'b' pin	'c' pin	'd' pin	'e' pin	'f' pin
1	1	2	3	4	5	6
2	9	10	11	12	13	14

Note: Remote connector is 15 way normal density D-type socket. Frame ground is pin 15.

FR1-6 GPI connections

Slot no.	'a' pin no.	'b' pin no.	'c' pin no.	'd' pin no.	'e' pin no.	'f' pin no.
1	8 (1)	9 (1)	18 (1)	26 (1)	19 (2)	20 (2)
2	7 (1)	16 (1)	17 (1)	25 (1)	10 (2)	11 (2)
3	5 (1)	6 (1)	15 (1)	24 (1)	1 (2)	2 (2)
4	4 (1)	14 (1)	13 (1)	23 (1)	3 (2)	4 (2)
5	3 (1)	12 (1)	22 (1)	21 (1)	12 (2)	13 (2)
6	10 (1)	11 (1)	19 (1)	20 (1)	21 (2)	22 (2)

Note:

Remote 1: 26 way high density D-type socket. Frame ground is pin 2.

Remote 2: 26 way high density D-type plug. Frame ground is pin 6.

Table shows Pin number (Remote number).

FR2-12 GPI connections

Slot no.	'a' pin no.	'b' pin no.	'c' pin no.	'd' pin no.	'e' pin no.	'f' pin no.
1	8 (1)	9 (1)	18 (1)	26 (1)	19 (2)	20 (2)
2	7 (1)	16 (1)	17 (1)	25 (1)	10 (2)	11 (2)
3	8 (3)	9 (3)	18 (3)	26 (3)	19 (4)	20 (4)
4	7 (3)	16 (3)	17 (3)	25 (3)	10 (4)	11 (4)
5	5 (1)	6 (1)	15 (1)	24 (1)	1 (2)	2 (2)
6	4 (1)	14 (1)	13 (1)	23 (1)	3 (2)	4 (2)
7	5 (3)	6 (3)	15 (3)	24 (3)	1 (4)	2 (4)
8	4 (3)	14 (3)	13 (3)	23 (3)	3 (4)	4 (4)
9	3 (1)	12 (1)	22 (1)	21 (1)	12 (2)	13 (2)
10	10 (1)	11 (1)	19 (1)	20 (1)	21 (2)	22 (2)
11	3 (3)	12 (3)	22 (3)	21 (3)	12 (4)	13 (4)
12	10 (3)	11 (3)	19 (3)	20 (3)	21 (4)	22 (4)

Note:

Remote 1 and Remote 3: 26 way high density D-type sockets. Frame ground is pin 2.

Remote 2 and Remote 4: 26 way high density D-type plugs. Frame ground is pin 6.

Table shows Pin number (Remote number).

FR2-8 GPI connections

Slot no.	'a' pin no.	'b' pin no.	'c' pin no.	'd' pin no.	'e' pin no.	'f' pin no.
1	8 (1)	9 (1)	17 (1)	18 (1)	25 (1)	26 (1)
2	6 (1)	7 (1)	15 (1)	16 (1)	23 (1)	24 (1)
3	8 (2)	9 (2)	17 (2)	18 (2)	25 (2)	26 (2)
4	6 (2)	7 (2)	15 (2)	16 (2)	23 (2)	24 (2)
5	4 (1)	5 (1)	13 (1)	14 (1)	21 (1)	22 (1)
6	2 (1)	3 (1)	11 (1)	12 (1)	19 (1)	20 (1)
7	4 (2)	5 (2)	13 (2)	14 (2)	21 (2)	22 (2)
8	2 (2)	3 (2)	11 (2)	12 (2)	19 (2)	20 (2)

Note:

Remote 1 and Remote 2: 26 way high density D-type sockets. Frame ground is pin 1.

PSU Relay connection on pin 10.

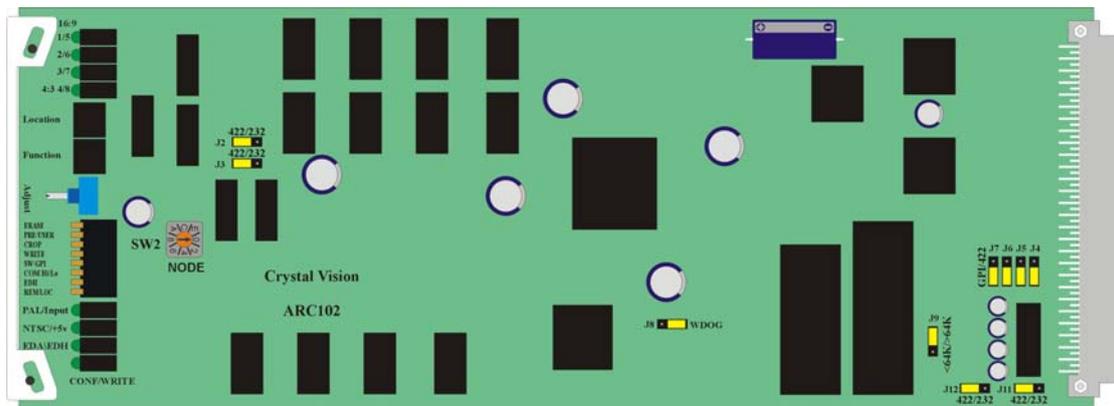
Table shows Pin number (Remote number).

Please refer to the Configuration chapter for help with using and configuring GPI control.

7 Configuration

The ARC102 is equipped with on-board jumpers to configure the module for the following control modes:

- RS232 or RS422 serial control
- GPI control



ARC102 showing configuration jumpers

Node addresses, and other board links

The Hex switch SW1 labelled NODE is normally set to position 0 (factory default). If the ARC102 is used in older frames such as FR2-12 or FR1-6 and these frames are being used with an active front panel, then the Hex switch SW1 can be used to set the node number, or unique address (0 to 15) of the card. No two cards in a frame should have the same node number.

The WDOG (Watchdog) jumper J8, should always be in position 2-3 and jumper J9 should be in the >64K position.

General purpose interface

The ARC102 is designed to allow an external three-bit switch shorting to ground to emulate the Preset/User Location switch in local mode. Each GPI has an internal pull-up resistor of 220R to +5v. A low level to trigger a GPI is <0.8V

Jumper and switch settings on the ARC102 module need to be set as follows for GPI control:

Switch/Jumper	Position for GPI control
Card-edge lever 8	DOWN for local mode
Card-edge lever 5	DOWN for GPI control
Jumpers 4, 5, 6 & 7	Set to GPI position

Note: In GPI control mode active panel/Statesman serial control is disabled.

GPI inputs 1 to 4 labelled 'a' to 'd' are available at the frame rear connector. Inputs 'a' to 'c' are used for Preset/User Memory recall. To recall either a preset or user memory location the GPI lines are asserted in a binary format.

The following table shows the GPI states required for preset or user memory selection:

Preset	User Memory	GPI state		
		'a'	'b'	'c'
1	Last selected	OPEN	OPEN	OPEN
2	1	GND	OPEN	OPEN
3	2	OPEN	GND	OPEN
4	3	GND	GND	OPEN
5	4	OPEN	OPEN	GND
6	5	GND	OPEN	GND
7	6	OPEN	GND	GND
8	7	GND	GND	GND

Note: GND means switch closure to frame ground.

Please refer to the Installation chapter for GPI pinout for each frame.

Using GPI lines for serial control

GPI lines 'e' and 'f' can be used for RS232/422 serial control as follows:

Jumper	Serial control
J11 in 232 position	RS232 - RX
J12 in 232 position	RS232 - TX
J11 in 422 position	RS422 - RX
J12 in 422 position	RS422 - TX

Note: J11 and J12 should be moved as a pair.

Remote control protocol

Baud Rate	19200
Parity	None
Data Bits	8
Stop Bits	1
Hand shaking	None

Please contact factory for remote protocol.

Active panel and Statesman control

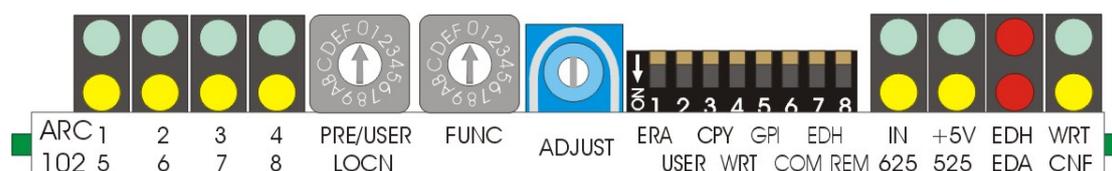
The ARC102 may be controlled from a local or remote active panel or from Statesman from serial control. This control interface does not use GPI lines, since dedicated serial control ports are available.

Please refer to the Active Panel and Statesman manuals for further details.

Jumpers J2 and J3 should always be left in the RS422 position for panel/Statesman control.

8 Problem solving

The front edge of the card provides useful power rail monitoring, in addition to card-edge controls and full status.



ARC102 front edge view

Status indication

LED Colour	Label	Status When ON
Green	IN	Valid input detected.
Green	+5V	Supply Voltage present.
Red	EDH	EDH error detected here
Green	WRT	User memory location being updated.
Yellow	625	625 line input detected.
Yellow	525	525 lines input detected.
Red	EDA	EDH error detected already
Yellow	CNF	Board undergoing configuration.

Note: The EDH flag is set if a checksum error is detected in the incoming ancillary data.
The EDA flag indicates that some piece of upstream equipment has already detected an error.

Statesman and any connected active panel can be used to look at signal status, but only the card-edge shows power rail, WRT and CNF status.

Basic fault finding guide and FAQ

The Power OK LEDs are not illuminated

Check that the frame PSU is functioning – refer to the appropriate frame manual for detailed information

Check that the card is seated correctly in the frame

There is no video output

Check that a valid video input is present and that any cabling is intact

The position or size range is not as expected

Try recalling a no-conversion preset before continuing with user adjustments

How do I change EDH status in Statesman or from an active control panel?

EDH transmission can only be enabled or disabled from the card-edge

What is the module serial number in the EDH menu for?

This may be required for technical support purposes

The card no longer responds to card edge or Statesman/front panel control

Check that the card is seated correctly and that the Power OK LEDs are lit

Check any active control panel/Statesman cabling

Check if the control panel/Statesman can control another card in the same rack

If necessary re-set the card

Re-setting the card

If required, the card may be reset by simply removing the rack power and re-applying power after a few seconds or by removing the card from the rack and then re-inserting the card

It is safe to re-insert the card whilst the rack is powered

9 Specification

General

Dimensions	100mm x 266 mm module with DIN 41612 connector
Weight	200g
Power consumption	8.3 W

Input

Number and type:	1 x 270Mb/s serial digital to EBU Tech 3267-E and SMPTE-259M Cable equalisation >200m Belden 8281 or equivalent Auto 625/525 line selection May contain embedded audio or data (10 bit data path)
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Outputs

Number and type:	2 x 270Mb/s serial digital to EBU Tech 3267-E and SMPTE-259M with EDH generation
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Picture processing

Processing:	8 bit with 10 bit data path in horizontal and vertical blanking interval to allow embedded audio or data Horizontal and vertical picture size adjust from 50% to 200% Horizontal and vertical picture offset by pixels and lines Factory presets for the 6 standard setups to put a 16:9 source on a 4:3 monitor, or a 4:3 source on a 16:9 monitor 1 field delay
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Adjustments

Preset adjustment:	Input Aspect Ratios 16:9, 4:3. Output Aspect Ratios 4:3, 16:9. Crop 0 to 255 horizontal luminance pixels either side of output image.
User adjustment:	The picture size horizontally and vertically can be adjusted from half normal size up to twice normal size. The picture can be offset horizontally and vertically up to one half of normal picture size. Crop 0 to 255 horizontal luminance pixels either side of output image.

GPI lines

Input levels: BCD selection of factory or user presets
Active: connect to ground
Inactive: 5 volts
Input pull-up resistance, 220R to +5V. Low trigger <0.8V

Serial ports

Ports: RS422/485 and RS232
19200 baud 8 bits, 1 stop no parity
2 serial ports - 1 connected to frame front panel, 1 can be linked to rear of frame instead of GPI signals
Front panel control from frame active panel and remote panel

Status monitoring

LED display Front of card edge visual monitoring with LED indicators to indicate:
PSU rails present/preset status/input presence/input standard/EDH error