

# ARC130S

## Aspect Ratio Converter


# Operator's Manual

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## Safety Warnings

**Always ensure that the unit is properly earthed and power connections correctly made.**

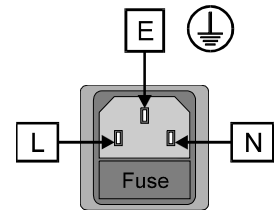
This equipment shall be supplied from a power system providing a **PROTECTIVE EARTH**  connection and having a neutral connection which can be reliably identified.

The power terminals of the IEC mains input connector on the rear panel are identified as shown below:

E = Protective Earth Conductor

N = Neutral Conductor

L = Live Conductor



### Power cable supplied for countries other than the USA

The equipment is normally shipped with a power cable with a standard IEC moulded free socket on one end and a standard IEC moulded plug on the other. If you are required to remove the moulded mains supply plug, dispose of the plug immediately in a safe manner. The colour code for the lead is as follows:

GREEN/YELLOW lead connected to E (Protective Earth Conductor)

BLUE lead connected to N (Neutral Conductor)

BROWN lead connected to L (Live Conductor)

### Power cable supplied for the USA

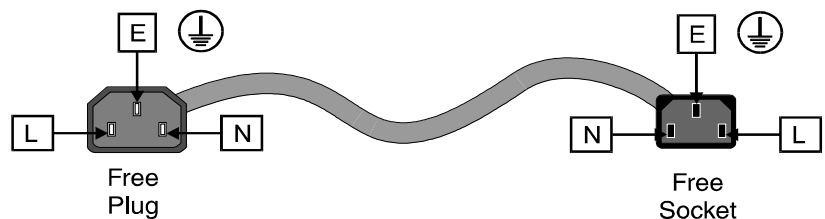
The equipment is shipped with a power cord with a standard IEC moulded free socket on one end and a standard 3-pin plug on the other. If you are required to remove the moulded mains supply plug, dispose of the plug immediately in a safe manner. The colour code for the lead is as follows:

GREEN lead connected to E (Protective Earth Conductor)

WHITE lead connected to N (Neutral Conductor)

BLACK lead connected to L (Live Conductor)

The terminals of the IEC mains supply lead are identified as shown opposite:



*Note that for equipment that is not fitted with a mains power switch, to comply with BS60950 Clauses 1.7.2 and 2.6.9, the power outlet supplying power to the unit should be close to the unit and easily accessible.*



### Warnings

Voltages within this unit can be lethal under certain circumstances. Where power is required to be connected to the unit during servicing great care must be taken to avoid contact with these voltages.

Maintenance should only be carried out by suitably qualified personnel.

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## EMC Standards

This unit conforms to the following standards:

Electromagnetic Compatibility-Generic Immunity Standard BS EN 50082-1:1992

*The European Standard EN 50082-1:1992 has the status of a British Standard and is related to European Council Directive 89/336/EEC dated 3rd May 1989.*

Electromagnetic Compatibility-Generic Emission Standard BS EN 50081-1:1992

*The European Standard EN 50081-1:1992 has the status of a British Standard and is related to European Council Directive 89/336/EEC dated 3rd May 1989.*

Federal Communications Commission Rules Part 15, Class A :1998

## Safety Standards

This unit conforms to EN60065:1992 as amended by amendment A1(May 1993) and amendment A2(March 1994). Specification for safety of technology equipment, including electrical business equipment.

## EMC Performance of Cables and Connectors

Snell & Wilcox products are designed to meet or exceed the requirements of the appropriate European EMC standards. In order to achieve this performance in real installations it is essential to use cables and connectors with good EMC characteristics.

All signal connections (including remote control connections) shall be made with screened cables terminated in connectors having a metal shell. The cable screen shall have a large-area contact with the metal shell.

### COAXIAL CABLES

Coaxial cables connections (particularly serial digital video connections) shall be made with high-quality double-screened coaxial cables such as Belden 8281 or BBC type PSF1/2M.

### D-TYPE CONNECTORS

D-type connectors shall have metal shells making good RF contact with the cable screen. Connectors having "dimples" which improve the contact between the plug and socket shells, are recommended.

## About this Manual

This manual covers the following product:

- ARC130S with 8 GPI inputs (via 2 x 9 way D connectors) and 8 GPI outputs via a 25 way D connector

## Packing List

The unit is supplied in a dedicated packing carton provided by the manufacturer and should not be accepted if delivered in inferior or unauthorised materials. Carefully unpack the carton and check for any shipping damage or shortages.

Any shortages or damage should be reported to the supplier immediately.

Enclosures:

- ARC 130S Aspect Ratio Converter
- Power cable
- Operators Manual
- 2 floppy disks containing software for up and down loading ARC configurations to a PC

## Software Version Amendments

### Notes about Versions Fitted

**Firmware.** This machine is shipped with version A32 of the firmware.

**Floppy Discs** Disk 1 ARC Configuration Loader Version 1.0.1  
Disk 2 ARC Configuration Loader Version 1.0.1

## Manufacturers Notice

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Microsoft Windows™

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## Manual Revision Record

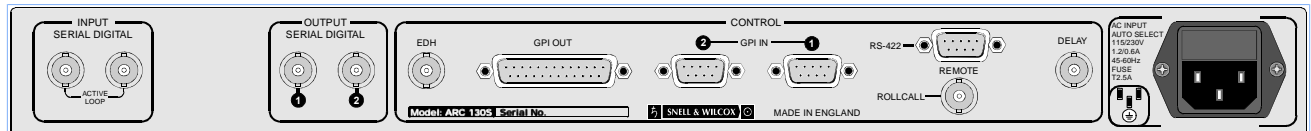
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## Introduction

### Aspect Ratio Converter ARC130S



Front Panel View



Rear Panel View

The ARC130S is a compact Broadcast-Quality Aspect Ratio Converter with serial digital inputs and outputs. It will aspect ratio convert in both directions, e.g. 16:9 to 4:3 or 4:3 to 16:9, and allows the picture area required for transmission to be selected from the input picture.

There are twelve preset conversion ratios plus ratios set up by the user. The user ratios can be stored in twelve memories and are quickly pushbutton selected when required for use.

The aspect ratio can also be remotely controlled either via an RS-422 port, RollCall or from contact closures via a General Purpose Interface (GPI).

The ARC130S is designed to fit in Continuity Suites, Studio's, Outside Broadcast Vans, etc. It facilitates the production of master tapes for broadcast using PAL+, D2MAC and digital transmissions. It facilitates postproduction and presentation of tapes mastered in 16:9 format through the current 4:3 format transmission system.

The ARC130S is a compact 1RU high unit for location on the desktop or in a 19-in. rack. It will operate in 525 and 625 line systems.

Vertical interval information is passed without conversion.

## Specifications

### Features

#### Signal Inputs

Serial Digital	1 Serial D1 525 or 625 via BNC loop-through connectors
Remote Control	9 way D-Type
GPI	2 via 9 way D-Type
Network Control	RollCall via BNC connector

#### Signal Outputs

Serial	2 sets of Serial Digital D1 via BNC connectors
Delay	1 Output via BNC connector
GPI	via 25 way D-Type

#### Control Functions

Blanking:	Controls blanking on both input and output
Display	Position, Size and Aspect Ratio
Enhanced Line 23 Setup	Input/Output Setup
Video Index	Input/Output Setup
Memory	Stores settings in memory and allows recall of memorized settings
VITS	VITS blanking
SETUP	Audio, Clipping, Freeze, Gamut Limiting, GPI, GPI Program, Input Loss, Input Standard (625, 525), Process, Test Pattern, Field Pairing Mode and line 21 video (525 line systems).
BYPASS	Non-interpolated output
USER	User display memories
Output Aspect Ratio	Letterbox: 16:9, 1.85:1, 1.66:1, 14:9. Full Screen: 16:9, 1.85:1, 1.66:1, 16:9 anamorphic 4:3 Curtains, 14:9 Curtains, 4:3 Full Width, 16:9 full Width

### Specifications

Input Standard	525/625 line
Serial Input Return Loss	better than 15 dB to 270 MHz
Serial Output Return Loss	better than 15 dB to 270 MHz

#### Power

Input Voltage Range	90 V to 260 V 45/90 Hz
Consumption	75 W maximum
Mains Fuse Rating	2.5 AT

#### Mechanical

Temperature Range	0 to 40° C operating
Case Type	1U Rack Mounting
Dimensions	483 mm x 530 mm x 44 mm (w,d,h)
Weight	7 kg



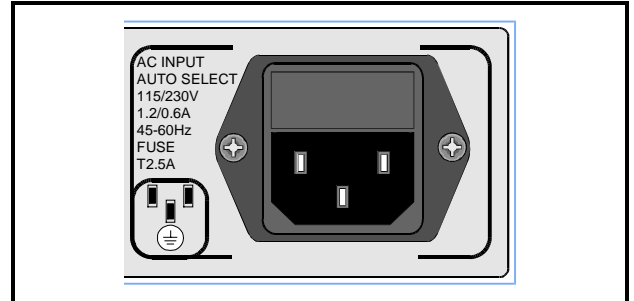
## Installation

### POWER CONNECTIONS

#### Power Supply

Mains power is supplied to the unit via a filtered IEC connector with integral fuse holder. The fuse rating is 2.5 A (T).

The unit automatically senses the supply voltage in the ranges 90V-132V and 176V-264V and sets itself up accordingly. No voltage adjustment procedure is required.



### ENVIRONMENT

The unit is ruggedly constructed to meet the normal environmental requirements. It is important that there is a free flow of air at both sides of the unit to dissipate the heat produced during operation. Installations should be designed to allow for this.

If the unit is to be rack mounted, first open the front panel by lifting up the the two levers at right and left of the panel, hinge the panel down and

pull it forward. The fixing “ears” behind the panel will be revealed and the unit can be mounted in the rack. Refit or close the front panel by pushing it back into position (the levers will click into place).

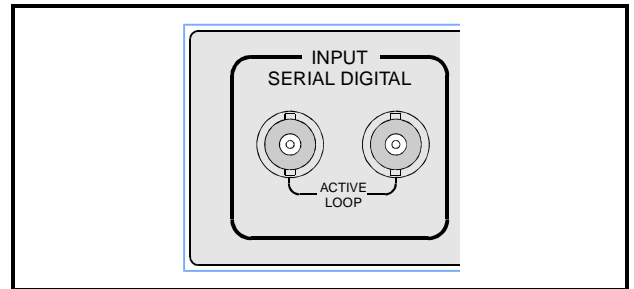
The rear of the base includes additional fixing holes on either side to allow a rear support to be added.

## Installation

### REAR PANEL CONNECTIONS

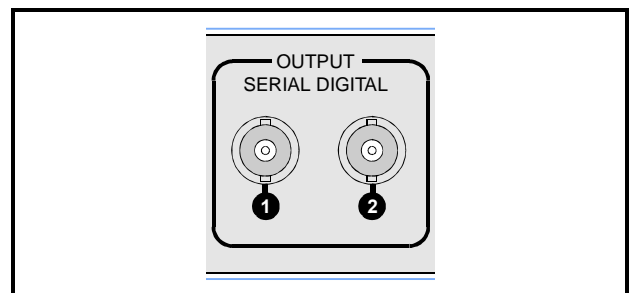
#### Digital Input

A BNC connector is provided for the serial digital input, with an active loop-through BNC connector also fitted.



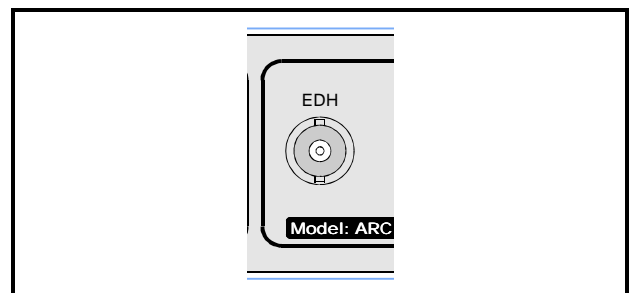
#### Digital Output

Two BNC connectors are provided for the serial digital outputs.



#### EDH

This connector has no function; connections should not be made to this connector.



## Installation

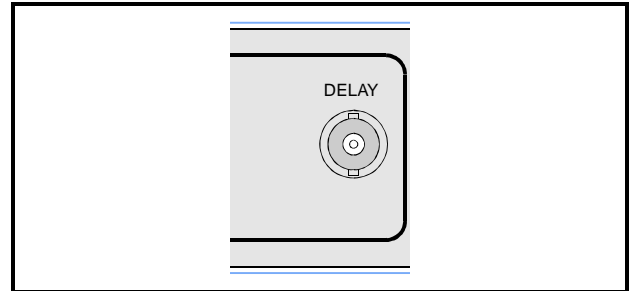
### Delay Output

Because the ARC130S contains a synchroniser, the through delay depends upon the setting of vertical genlock timing.

If the input and output video are co-timed, then the delay through the ARC130S is four fields (80 ms for 625 line systems and 66.7 ms for 525 line systems). If the input and output video are not co-timed then the range of delay through the ARC is 3.5 to 4.5 fields.

The delay pulse output from the ARC130S accurately represents the delay through the unit. The pulse is high for a period equal to the delay through the ARC. It can be connected to a Snell and Wilcox audio delay module to automatically set a compensating audio delay.

If the ARC130S is put into Bypass mode or, field pairing mode, then the nominal delay remains at four fields. However because the unit acts as a frame synchroniser in these modes, the delay range of the unit is now increased to between 3 and 5 fields.



## Installation

### Remote Control

The unit can be controlled from the special remote panel option via an RS-422-A D-type connector (see Table - *RS-422-A Remote Connections*)

If a remote panel is connected to the RS-422-A port, set the "Front Panel/Remote Comms/Auxiliary switch on the ARCOPI2A card to "FRP & REM" (centre), see Fig. 3.1

The front panel can be disabled by setting the switch to REM (right hand position) see Fig. 3.1

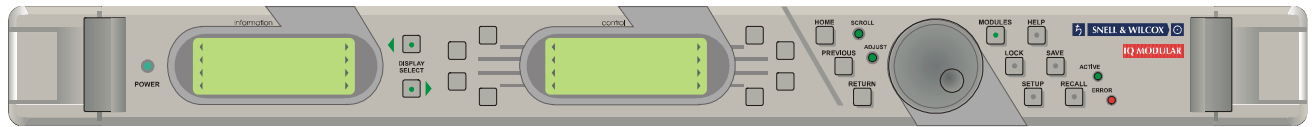
### RS-422-A Remote (Master) Connections

Pin	Function	Direction
1	Ground	
2	Transmit –	ARC → Remote
3	Receive +	ARC ← Remote
4	Rec Sig Common	
5	Spare	
6	Trans Sig Common	
7	Transmit +	ARC → Remote
8	Receive –	ARC ← Remote
9	Ground	

*The Baud Rate is 38.4Kbs, half duplex. Format is 1 start bit, 7 data bits, 1 parity bit, 1 stop bit.*

## Installation

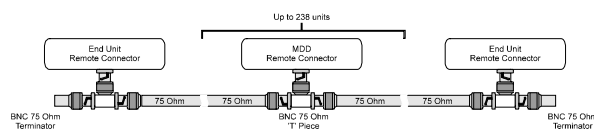
### OPERATION FROM A KUDOS ACTIVE FRONT PANEL FITTED TO A SHOEBOX



#### OPERATIONAL OVERVIEW

The ARC130S has provision to be remotely controlled via two different interfaces, either S&W RollCall, or RS422.

Interface to the "RollCall" communications network is via the single BNC connector. Connections should be made by means of a 'T' piece ( $Z_0=75$  Ohms) to a 75 Ohm cable system as shown below. It should be noted that both extremities of the cable system must be terminated in 75 Ohms and the maximum number of units limited to 240 on one single cable run.



The communications network is a specially designed remote control network system and many more units can be accommodated by using a "Network Bridge". Remote control can come from either a dedicated front panel or "shoe-box" or a standard IBM compatible PC. Full protocol documentation and more detailed information is available on request from the supplier.

The RS 422 remote control interface is via the 9-pin female 'D' connector. Protocol information is also available on request from the supplier.

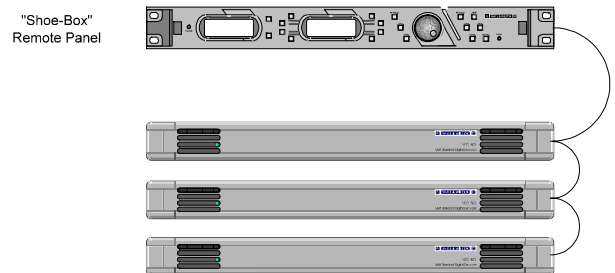
For more detailed information about the operation of the remote panel or PC software please consult their relevant manuals. e.g. Shoebox operator's manual.

For specific information about the RollCall menu system for the ARC130S see Section 4, Operation, **RollCall Menu System** on page 4.34

#### BASIC ROLLCALL OPERATION

All the features from the menu system are available remotely with the same options structure. This maintains compatibility and facilitates easy operation for users familiar with the unit.

The most common remote configuration is shown below where many units are connected to the network for remote control by one remote panel or "shoe-box".



#### Typical Set-up

The network address for the ARC is set using the switches SW3 and SW4 on the Output Interface card. See fig 3.1 on page 3.8.

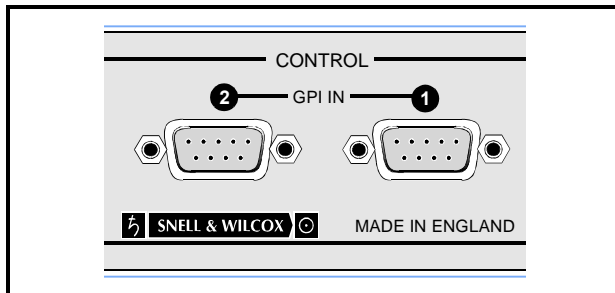
Parameter changes are reflected both locally and remotely. For example, if the output is changed to the colour bars test pattern by a remote unit then any further access from the card edge to the PATTERN TYPE option will indicate this change. Similarly, if the card edge changes a parameter then this will be reflected on the display panel of the remote unit.

## Installation

### GPI

GPI functions are implemented as follows:

#### GPI Inputs



These are accessed via two 9-way D type connectors labelled 1 and 2. Each connector has 4 inputs and connections are as below.

GPI = GPI input

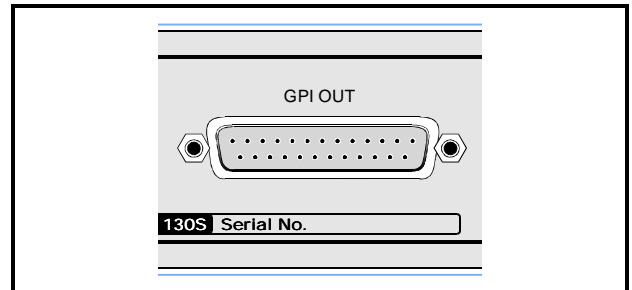
#### GPI input 1

Pin 2	GPI 0 signal
Pin 6	GPI 0 return
Pin 3	GPI 1 signal
Pin 7	GPI 1 return
Pin 4	GPI 2 signal
Pin 8	GPI 2 return
Pin 5	GPI 3 signal
Pin 9	GPI 3 return
Pin 1	safety ground.

#### GPI input 2

Pin 2	GPI 4 signal
Pin 6	GPI 4 return
Pin 3	GPI 5 signal
Pin 7	GPI 5 return
Pin 4	GPI 6 signal
Pin 8	GPI 6 return
Pin 5	GPI 7 signal
Pin 9	GPI 7 return
Pin 1	ground.

#### GPI Outputs



These are accessed via a 25-way D type connector and connections are as follows:

GPO = GPI output

Pin 2	GPO 0 signal
Pin 14	GPO 0 return
Pin 3	GPO 1 signal
Pin 15	GPO 1 return
Pin 4	GPO 2 signal
Pin 16	GPO 2 return
Pin 5	GPO 3 signal
Pin 17	GPO 3 return
Pin 6	GPO 4 signal
Pin 18	GPO 4 return
Pin 7	GPO 5 signal
Pin 19	GPO 5 return
Pin 8	GPO 6 signal
Pin 20	GPO 6 return
Pin 9	GPO 7 signal
Pin 21	GPO 7 return
Pins 1,10,11,12,13,22,23,24,25 ground	

The GPO output characteristics are as follows:

Operating Voltage Range	0 to $\pm 60$ V (DC/AC peak)
Maximum Load current	1.0 A (AC/DC)
Maximum On-State Resistance @ $T_{amb} = +25^{\circ}\text{C}$	500 mOhm
Minimum Off-State Resistance @ $T_{amb} = +25^{\circ}\text{C}, V = \pm 48\text{V}$	100 MOhm

## Installation

### GPI Overview

The GPO provides contact closure tally outputs that can be used to turn on lamps etc.

GPO 0 tracks GPI 0 so if the display memory that GPI 0 recalls is active then GPO 0 will close. Similarly, GPO 1 tracks GPI 1 etc.

This functions even if the GPI inputs have been assigned different recall memories and if the memory was recalled via a front panel button rather than via the GPI.

So, if GPI 3 recalls AUTO, then whenever AUTO is selected GPO 3 will be closed.

In GPI binary mode, the four LSB's (GPO 0 to GPO 3) GPI contacts indicate the binary GPI memory in use. The four MSB's (GPO 4 to GPO 7) contacts are closed if a GPI binary memory is being used; otherwise they are open.

If a non-binary GPI memory is being used all 8 contacts will be open.

### GPI interface Delay

The GPI interface on the ARC130S has a delay that matches the video processing delay through the ARC.

This means that if a given input-video field is desired to produce the first output-field built with a new aspect ratio conversion; the GPI contacts that recall that new aspect ratio conversion should be closed during the field when that video field is present at the ARC130S input.

Ideally, the contact should be closed a few lines after the vertical sync group of the reference video, and, should remain closed for at least one field period.

## Installation

Included with ARC130S software version A32 are 2 floppy disks containing software for up and down loading ARC configurations to a PC.

### ARC Configuration Loader Program

The downloading and uploading of ARC configuration files is made possible by the Windows program 'ARC Configuration Loader'. Data contained in existing ARC configuration files (held on the PC) may be downloaded to the ARC or, ARC hardware configurations may be uploaded to the PC. The configuration files held on the PC are in a simple ASCII text format. The configuration files contain all parameters held in the ARC. This includes all display memories of all types that the user can program. This allows the user to configure an ARC once and then, send that same configuration to multiple units. Also, if the ARC software is upgraded, the user can store the ARC configuration before the upgrade and then download it afterwards so that the configuration does not have to be re-done.

The ARC Loader program uses the ARC RollCall network BNC connection. Thus, the user must have a means of connecting to the ARC RollCall BNC before the program can be used. Therefore a RollCall 'Shoebox' or a PC equipped with the high speed RollCall network card must be available.

The ARC loader program is designed to work with ARC software version A28 and onwards. Note that software versions A24 and onwards allow the user to upload the configuration data from the ARC to the PC but, the download operation can fail. This will allow users of software versions A24 to A27 to capture their ARC configurations before upgrading to A28.

### ARC Configuration Loader Installation

The distribution of the ARC Configuration Loader includes a **setup.exe** program file. This file is kept on the floppy disk labelled **DISK1**. Running the ARC Configuration Loader **setup.exe**, either by mouse click from within Windows Explorer, or from the Windows Start\Run menu, will commence the setup sequence. **SETUP SHOULD ONLY BE RUN LOCALLY TO THE TARGET HOST MACHINE**, this may be achieved either by installing locally from floppy disk or, by copying the installation files to a local, temporary directory and running setup from there. The ARC Configuration Loader requires the RollCall server program RollOLE to be pre-installed. The ARC Configuration Loader setup program searches for a registered installation of RollOLE prior to commencing its own installation sequence. If the RollOLE executable is found and validated then ARC Configuration Loader will install. Conversely, if setup is unable to find or validate RollOLE.exe it will inform the operator of the requirement to install, or re-install, RollOLE and then setup will exit. The installation of RollOLE should then be carried out before re-attempting to run the ARC Configuration Loader setup program.

A compatibility issue has arisen in that RollOLE makes use of Windows Dynamic Link Library (.dll) files, the current RollOLE is compatible with the Library files required to run Internet Explorer (IE) 4.0 or later. Earlier versions of RollOLE will not run correctly on systems that have installed on them IE4.0, conversely, the current version of RollOLE cannot run using the .dll files found on a system using IE3.x or earlier. The setup program will therefore detect the absence of IE, or if present the version of IE, and may accordingly give the operator the option to continue to load the ARC Configuration Loader, or exit if a configuration not suited to RollOLE is detected. This is only an issue for systems running Win95, as Win98 and WinNT4.0 implicitly use IE4.0 or later.



## Installation

### ***ARC Configuration Loader Operation***

The ARC Configuration Loader program can be run by double clicking on it from Explorer or via the START menu. When the program is run the User needs to set two parameters and then up and downloading may begin.

#### **1. Configuration File Name**

This is the name of the file on the PC that the user wishes to access. If an Upload is undertaken then the data from the ARC will be stored in this file. If a Download is undertaken then data from this file will be sent to the ARC. A valid filename must be chosen before an Upload or Download can be undertaken. Note, the file extension must be .TXT. The filename can be typed in or, the Browse button may be used to navigate to the desired file.

#### **2. ARC Address**

This allows the user to select which ARC on the RollCall network the program will connect to. The user must select an ARC before an Upload or Download can be undertaken. The find module button should be clicked to navigate to the desired unit.

#### **3. Download**

Clicking this button will send a configuration file from the PC to the chosen ARC.

#### **4. Upload**

Clicking this button will send configuration data from the ARC to the selected PC file.

### **Program Menu Selections**

The following Menu selections are available to operators of the ARC Configuration Loader:

#### **1. File: Exit**

Ends the ARC Configuration Loader Program.

#### **2. Help: About**

Provides Information about the ARC Configuration Loader including version data

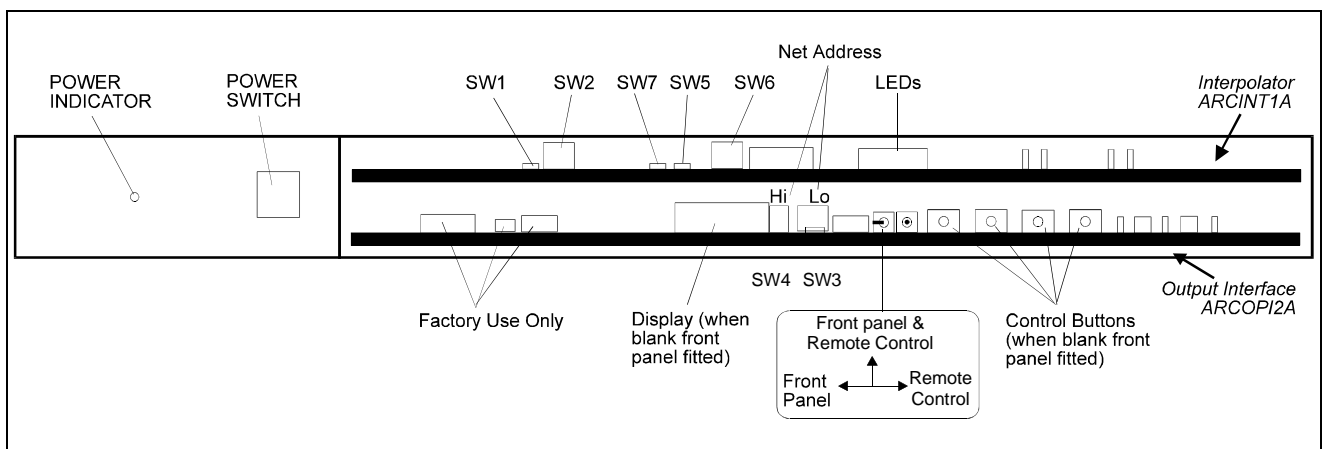
## Installation

### SWITCHING ON

Check that power is connected to the unit and is switched on. Open the front panel by pushing up the levers at the ends of the panel, and hinging the panel down and sliding partly out.

Set the switch on the Power Unit (see fig. 3.1) to on. Check that the indicator lamp illuminates green and the alpha-numeric display is active.

**Fig. 3.1 PCB Locations ARC 130S**



### FAN FAIL WARNING

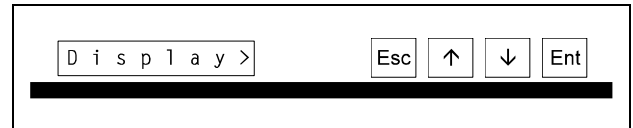
If when the power is turned ON the power indicator is RED and the card edge alpha-numeric display on the active front panel displays **FAN FAIL** message, the unit should be turned OFF as this indicates a failure of the cooling fan which is located behind the power switch panel.

## SWITCH CONTROLS

To gain access to the controls, open the front panel by lifting up the levers at right and left of the panel, hinge the panel down and pull it forward.

To provide a full range of functions with just 4 buttons and an 8-digit display, a menu system is used.

During normal operation, the display slowly cycles through the status of current operation (Home Display). Typically these will be the line standard, the aspect ratio, genlock status and pattern generated if on.



The ENT (Enter) key interrupts the Home Display and allows you to enter the menu structure. It is also used to display a selected option. The ↑ and ↓ keys enable you to scroll up and down through the menu. The ESC (Escape) key returns you to the previous menu level.

A ">" at the right of an option on display indicates that selecting the option (pressing ENT) will lead to another menu level without changing a system setting. If there is not a ">" at the right, pressing ENT will change the indicated system setting.

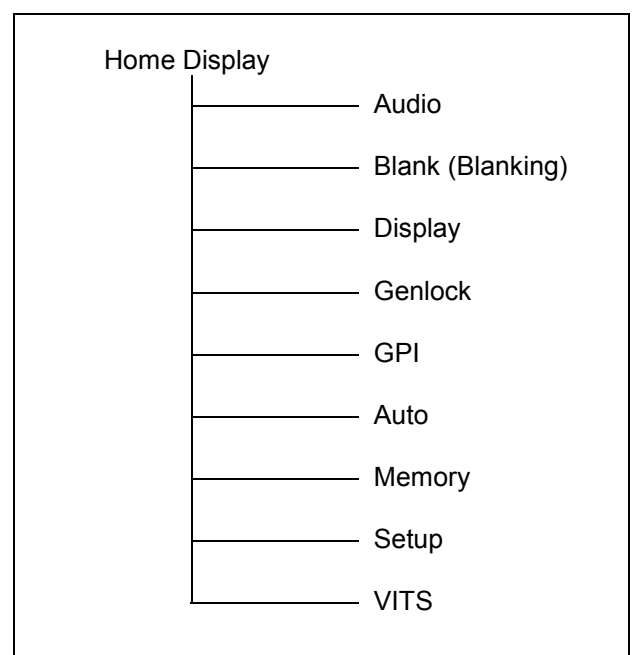
If the menu being displayed allows you to pick one of a number of options, the currently selected option is indicated by an "\*" (asterisk) at the left.

Pressing ↑ and ↓ simultaneously returns a parameter to its preset value.

Pressing ENT and ESC simultaneously will return you to the Home Display.

## TOP MENU

Each of the items on the menu is described separately.



## AUDIO

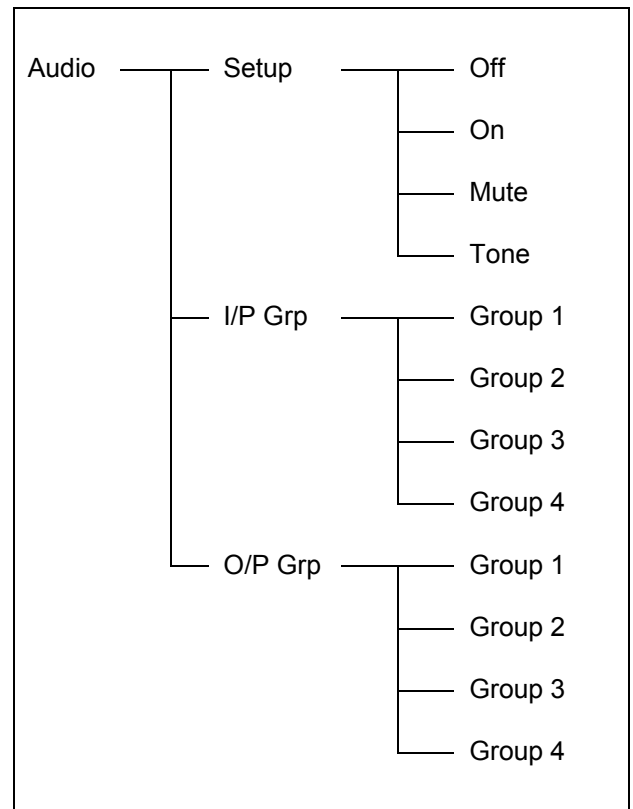
This allows the status of the audio channels to be set up.

Use the I/P Group item to set the input group to 1, 3, or 4.

Use the O/P Group item to select the output group to 1, 2, 3, or 4.

The embedded audio output may be set to Off (no audio data), On (audio data from selected input group), Mute (silence) or Test Tone.

An audio buffer compensates for the video delay.



## BLANKING

From the Home Screen, press ENT and scroll to Blank. Press ENT and scroll between Input and Output. Press ENT on the selected function.

Selecting **Input** allows you to adjust the input blanking. Input blanking is used where the source video applied is known to have pixels/lines at the edge of the picture that you do not want to display. The ARC130S will then blank any output data which has been generated by that input data, regardless of the display control settings.

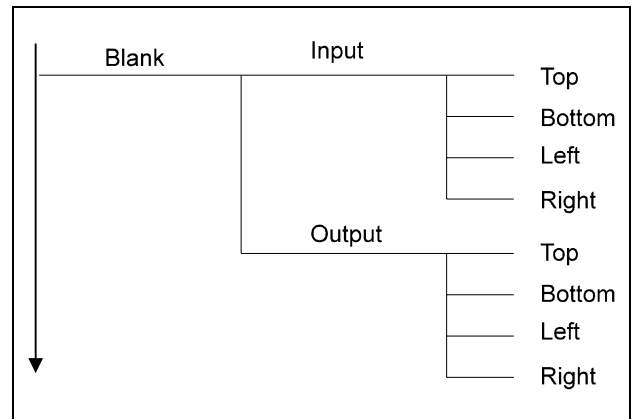
Selecting **Output** is used where you do not want the output to be active on more than a certain range of output lines. For example you can impose an artificial letterbox by bringing the top output blanking down the screen and the bottom output blanking up the screen.

Top: Adjusts the top line of blanking. 0 equals no blanking on any output lines that would normally be visible, 1 equals blank the first active line, etc.

Bottom: Adjusts the bottom line of blanking. 576 (PAL) or 486 (NTSC) equals no blanking on any output lines that would normally be visible. 575 (PAL) or 485 (NTSC) equals blank the last active line, etc.

Left: Adjusts the left-hand edge of blanking. 0 equals no blanking on any output pixels that would normally be visible. 1 equals blank the first active pixel.

Right: Adjusts the right-hand edge of blanking. 720 equals no blanking of any output pixels that would normally be visible. 719 equals blank the last active pixel.



## DISPLAY

From the Home Screen, press ENT and scroll to Display. Press ENT and scroll between Preset and Adjust. Press ENT on the selected function.

**Preset** allows selection of one of the preset aspect ratio conversions. **Adjust** allows you to create your own aspect ratio conversion.

Auto: Line 23 signalling or video index (PAL only) is used to control the aspect ratio conversion.

4:3>4:3: No aspect ratio conversion.

1.77F>FH: 16:9 anamorphic to full height conversion (left and right-hand edges of input video lost).

1.85L>FH: 1.85:1 letterbox input to full height conversion (left and right-hand edges of input video lost).

1.66L>FH: 15:9 letterbox to full height conversion (left and right-hand edges of input video lost).

1.55L>FH: 14:9 letterbox to full height conversion (left and right-hand edges of input video lost).

1.77F>LB: 16:9 anamorphic to letterbox conversion.

1.85F>LB: 1.85:1 anamorphic to letterbox conversion.

1.66F>LB: 15:9 anamorphic to letterbox conversion.

1.77>1.55: 16:9 anamorphic to 14:9 letterbox conversion.

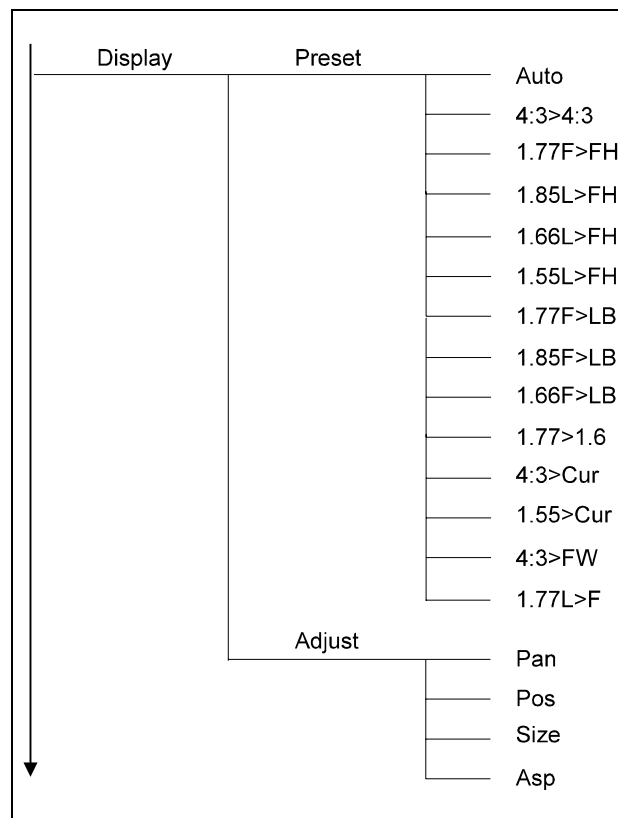
4:3>Cur: 4:3 to 16:9 curtains, i.e. horizontal crush with black bars to left and right of output.

1.55>Cur: 14:9 to curtains, i.e. horizontal crush with black bars to left and right of output.

4:3>FW: 4:3 to 16:9 full width conversion, i.e. top and bottom of picture lost at the output.

1.77L>F: 16:9 letterbox to 16:9 anamorphic conversion.

*See next page for descriptions of the nomenclature used for the above aspect ratio conversions.*

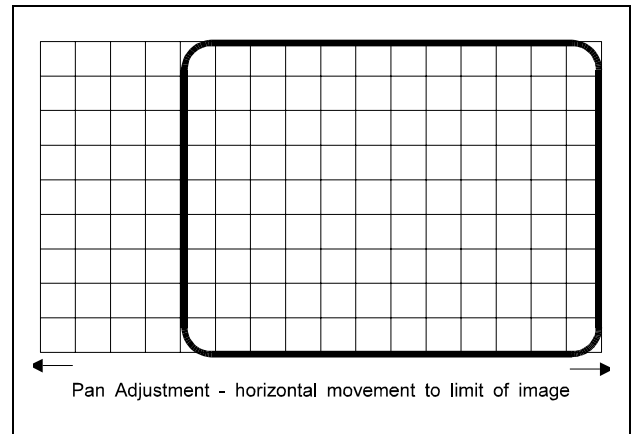


CONVERSION DESCRIPTION NOMENCLATURE				
Front panel* Designation	BBC Notation*	Full Description	Aspect Value	Size Value
1.77F>FH	16F16 > 12F12	16:9 Anamorphic picture to full height 4:3 picture for presentation on a 4:3 screen (left hand and right hand edges of original 16:9 image are cropped)	1.333	1.000
1.85L>FH		1.85:1 Letterbox picture to full height 4:3 picture with left hand and right hand edges of original 1.85:1 image cropped	1.000	1.388
1.66L>FH	15L12 > 12F12	15:9 letterbox picture to full height 4:3 picture with left hand and right hand edges of original 15:9 image cropped	1.000	1.250
1.55L>FH	14L12 > 12F12	14:9 letterbox picture to full height 4:3 picture with left hand and right hand edges of original 14:9 image cropped	1.000	1.167
1.77F>LB	16F16 > 16L12	16:9 Anamorphic picture converted to 16:9 letterbox picture for presentation on 4:3 screen (black bars above and below image)	1.333	0.750
1.85F>LB		1.85:1 Anamorphic picture converted to 1.85:1 letterbox picture for presentation on 4:3 screen (black bars above and below image)	1.388	0.721
1.66F>LB	15F15 > 15L12	15:9 Anamorphic picture converted to 15:9 letterbox picture for presentation on 4:3 screen (black bars above and below image)	1.250	0.800
1.77F>1.55L	16F16 > 14L12	16:9 Anamorphic picture converted to 14:9 letterbox picture for presentation on a 4:3 screen (black bars above and below image and right hand and left hand edges of picture slightly cropped)	1.333	0.857
4:3>Cur	12F12 > 12P16	4:3 image converted to 4:3 pillarbox/curtains image in 16:9 anamorphic. (4:3 horizontally squeezed image with black bars to left and right of output)	0.750	1.000
1.55>Cur	14L12 > 14P16	14:9 letterbox picture in 4:3 converted to 14:9 pillar-box/curtains image in 16:9 anamorphic (14:9 horizontally squeezed image with 1:9 black bars to left and right of output)	0.750	1.167
4:3>FW		4:3 image anamorphically squeezed and scaled up to fill full 16:9 width. Top and bottom of original 4:3 image cropped at output	0.750	1.333
1.77L>1.77F	16L12 > 16F16	16:9 letterbox in 4:3 converted to 16:9 anamorphic full height image	0.750	1.333

**\* For a detailed explanation of the these code specifications please refer to Section 6 “Aspect Ratio Technical Codes for Video and Picture Sources”**

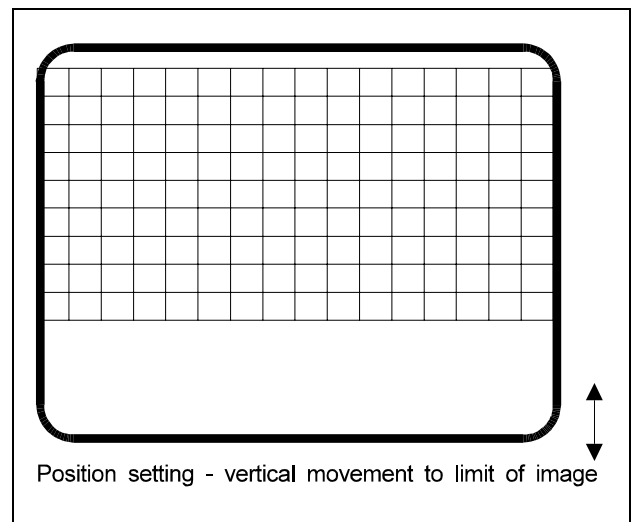
Pan: adjusts the horizontal position of the output.

*Note that this option does not appear if V only processing is selected.  
(see set-up menu page 4.11)*



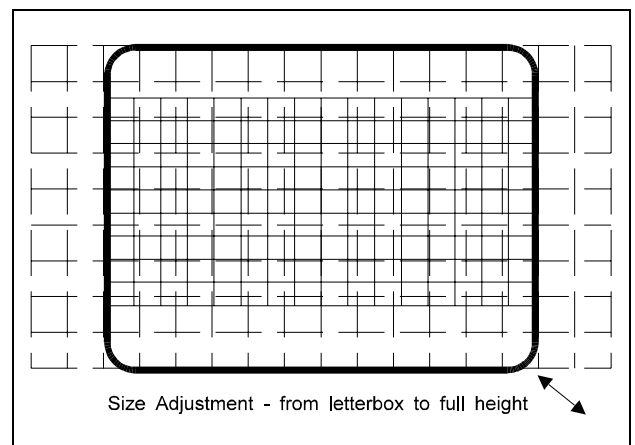
Pos: adjusts the vertical position of the output.

*Note that this option does not appear if H only processing is selected.  
(see set-up menu page 4.11)*



Size: Adjusts the horizontal and vertical size simultaneously while maintaining the aspect ratio. The product of SIZ and ASP is limited to the range 0.50 to 2.00, and SIZ is limited to the range 0.50 to 2.00.

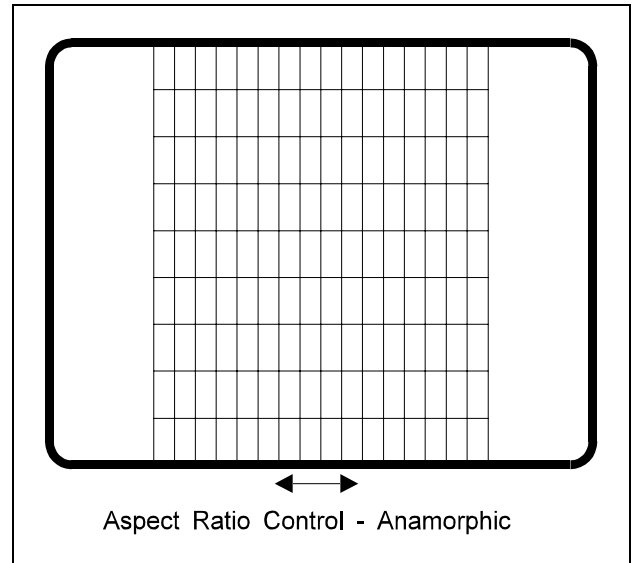
*Note that this option does not appear if H only processing is selected.  
(see set-up menu page 4.11)*





**Asp:** Adjusts the horizontal size of the output, so changing the aspect ratio. The product of SIZ and ASP is limited to the range 0.50 to 2.00, and ASP is limited to the range 0.25 to 2.00.

*Note that this option does not appear if V only processing is selected.  
(see set-up menu page 4.11)*



## GENLOCK

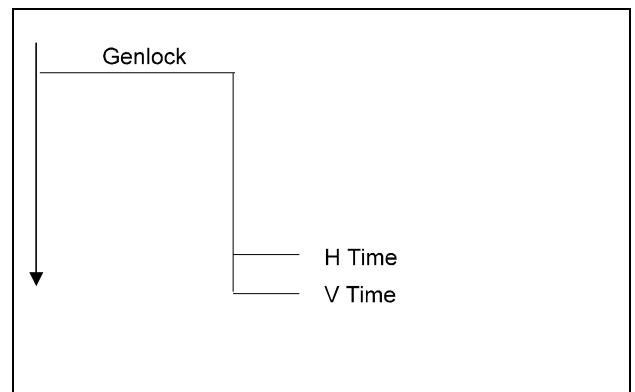
Selects adjustment of the Genlock parameters.

From the Home Screen, press ENT and scroll to Genlock. Press ENT and scroll between H Time and V Time. Press ENT on the selected function.

The ARC130S will always lock to the incoming video.

**H Time** allows you to adjust the horizontal Genlock timing with respect to the reference, in pixels.

**V Time** allows you to adjust the vertical Genlock timing with respect to the reference, in lines.



## GPI

This allows you to select GPI inputs On, Off, On+Auto and Binary.

Off

The GPI function is inactive.

On

The GPI function is active. (One contact closure per memory recall)

On+Auto

The GPI function is active. (One contact closure per memory and all four contact closures turns on Auto mode)

Note In order that the GPI contacts may be released without the unit reverting to another GPI memory recall, it is necessary that all four GPI contacts are open for at least one field after Auto has been selected using the GPI. Operation of the GPI is suspended until this condition has been met.

## Binary

When the GPI input is put into binary mode the four GPI inputs are treated as one four bit number. This means that there are sixteen possible GPI input states. Each of the GPI input-states recalls a special GPI memory. These memories store the same parameters as the User Display memories and the Auto (video index / line 23) memories. Thus one should set up the machine as required (size, asp, pan, pos, bypass and output aspect ratio signaling parameters) then, one can program the required GPI memory. When that particular GPI state is present the appropriate memory is recalled.

This is useful as the GPI port can be used to emulate the four video index signaling bits if they are not present on the input signal.

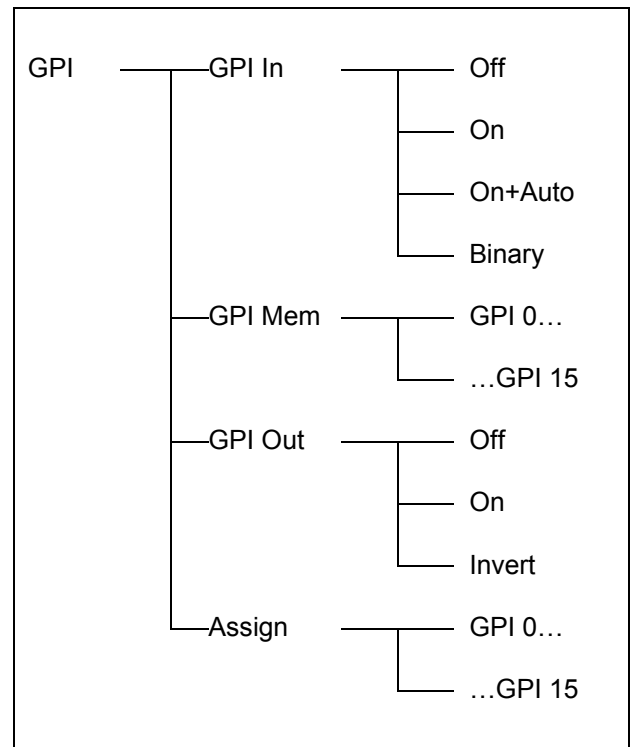
## GPI Mem

This lets you program the binary GPI memories. If you select this, the display shows:

GPI 0

Pressing the arrow keys cycles through GPI 1 , GPI 2.....GPI 15.

You can then store the GPI memory settings for the indicated binary GPI memory.



Using the cardedge and active front panel menus an extra item will appear when an 8-way GPI board is detected.

This is **GPI Out** This allows the GPO to be turned OFF, (all contacts open), turn it ON (default setting) or turn it ON but work inverted (i.e. contact open to indicate active memory).

The menu text is

GPI Out - Off

On

Invert

Version A20 of the software will let you assign the GPI's from the cardedge controls as well as from the active front panel and RollCall.

It has 8 entries (if 8 GPI inputs are available or 4 if only 4 inputs are available) and the menu reads:

GPI 0                      GPI 0  
to                      OR                      to  
GPI                      GPI 3

The assignment operates in the same way as using the active front panel menu. That is, set the ARC to recall the required display memory and then assign the GPI to it.

By default GPI's 0 to 7 recall user memories 1 to 8 respectively.

## AUTO

This allows the user to control the action of the ARC130S in the presence of an incoming Line 23 aspect ratio or video index signal. From the Home Screen, press ENT and scroll to Auto.

### Input

This function allows the following selections to be made to the input setup:

#### Source

This allows the source of automatic aspect ratio control to be selected from the following:

L23 ETSI  
L23 AFD  
Video Ind

#### L23 Blk

This sets the blanking action applied to line 23. There are three options.

**Auto** The machine will either automatically provide the appropriate output signalling blanking using the input signalling

**Not Blk** The input signalling will not be blanked

**.5 Line** The first half line of the line 23 signalling will be blanked

#### L23 WFM

This gives you a choice of Normal or Non-Std.

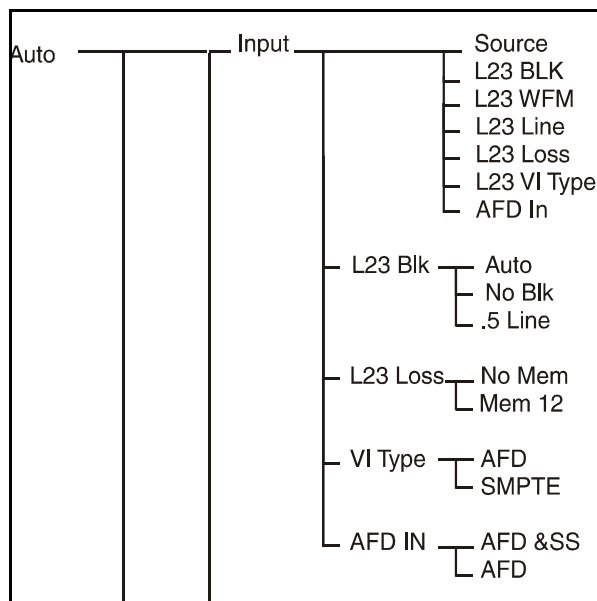
Normal should be selected for all legal incoming line 23 signals.

Non-Std should be selected for incoming line 23 sources where there is no blanking period between the line 23 signalling and the following video.

#### L23 Line

This controls which input video line the incoming line 23 style widescreen signalling will appear. This is useful when equipment up-stream of the ARC strictly enforces blanking of the first half of line 23 but, can pass other vertical interval lines.

Selecting this menu item displays the input line number that can be adjusted in the range 7 to 23. The default value is 23.



#### L23 Loss

This reveals a menu that gives a choice of No Mem or Mem 12

This controls what happens when the ARC is in auto mode, and the incoming line 23 signal disappears. If No Mem is selected then the ARC stays exactly as it is until a valid line 23 signal reappears. If Mem 12 is selected then the ARC recalls User Display memory 12 when the line 23 input disappears

#### VI Type

This selects what type of video index signal is being applied to the ARC input.

Either AFD Spec or SMPTE (186) may be selected. If SMPTE186 is selected only the bottom 3 bits of the VI data are examined.

#### AFD IN

This selects the type of AFD information derived from the input.

**AFD & SS** All AFD and scanning system data

**AFD** Active region descriptor data only

**Output**

This function allows the following selections to be made to the output setup:

**Mode**

This controls the way the output signalling is selected.

**Follow** The output line 23 and VI data will be determined automatically by the ARC130S based on either the preset aspect ratio conversion selected, the user memory in use or, the incoming AUTO aspect ratio control signal.

**Forced** The ARC130S does not use the stored values but uses the values visible on the menus (see below).

**Line 23 Set**

This is a setup menu for the Line 23 output

**Type**

This sets the type of output-line 23. Selections are either

ETSI

or

AFD

**Output On/Off**

This option has a toggle action. It determines whether or not Line 23 signalling will be present on the output of the ARC 130S .

**User Pass**

If PASS is selected then the user bits are copied from an incoming enhanced line 23 signal to the output if the enhanced line 23 signal has been selected as the source of automatic aspect ratio control.

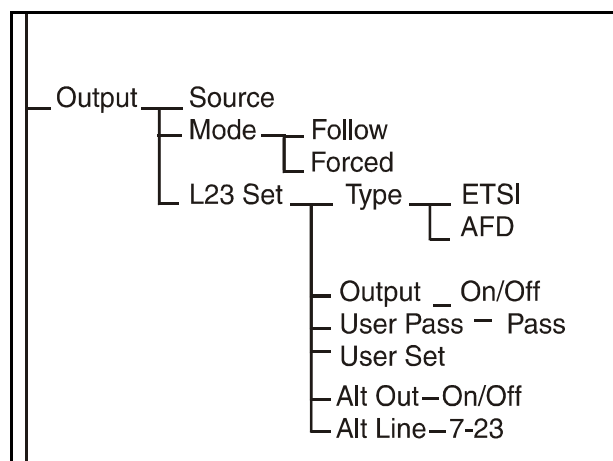
**User Set**

This allows the user to set the four enhanced line 23 output user bits to the value shown.

**Alt Out**

This allows the user to turn on and off an alternative line 23 widescreen signalling output. This alternative line 23 output can be placed on a different line to the normal line 23 widescreen signalling output. This is useful when equipment downstream of the ARC strictly enforces blanking of the first half of line 23 but, can pass other vertical interval lines.

*Note that the alternative line 23 output will only work if the normal line 23 output is turned on. If the normal line 23 output is turned off, the alternative line 23 output will also be turned off.*

**Alt Line**

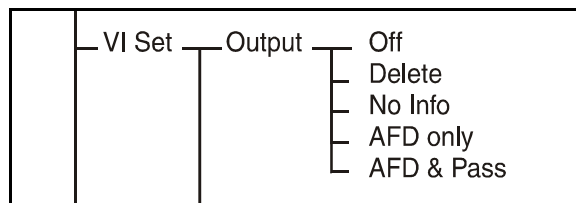
This controls on which output video line the line 23 style widescreen signalling will appear. Selecting this menu item displays the output line number that can be adjusted in the range 7 to 23. The default value is 23.

**VI Set**

This function sets the state (Output is) and the form of the video index information.

**Output**

This selects the type of video index information available at the ARC output.



Off	No video index output.
Delete	Set all VI bits to zero including CRCs.
No Info	Set all VI data to zero with valid CRCs.
AFD only	Set all fields to zero except Octet 1 the scanning system field which contains the VI data inserted by the ARC130S .
AFD & Pass	Insert new Octet 1 values but pass all other VI data from the input video.

*Note – if you wish to pass VI data from the input of the ARC130S to the output then it is necessary to set the vertical interval lines containing the VI data to be not blanked. Otherwise, the input VI information is lost.*

**Type**

This selects what form of video index output signal is generated. Selections are:

AFD Spec  
or  
SMPTE 186

**L23 Dat**

*Aspect*

If Auto is selected, the ARC 130S makes its best estimate of the output format and includes that in the Line 23 output.

The other items are the standard line 23 output options and if one is selected, that will be signalled on the output, regardless of the actual video output.

*Enhance*

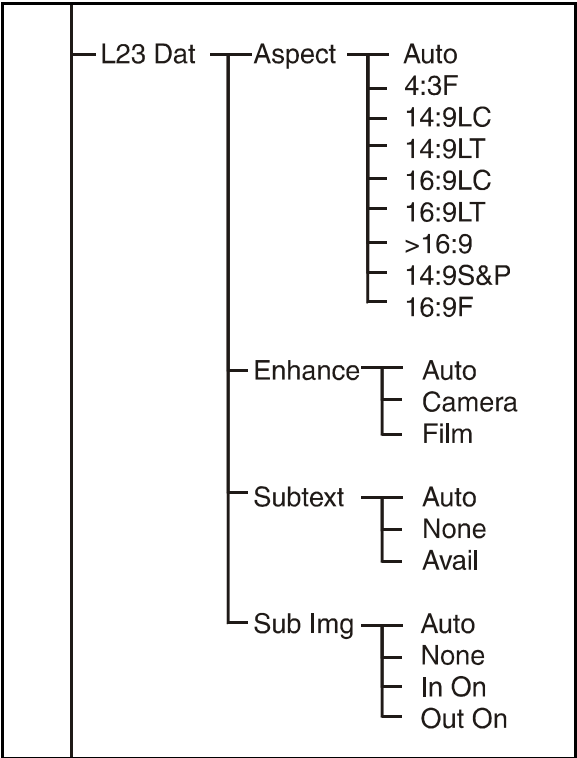
The ARC 130S will automatically provide the output signalling from the input signalling if Auto is selected. Alternatively, Camera or Film can be selected to suit the input material source.

*SubText*

The ARC 130S will automatically provide the output signalling from the input signalling if Auto is selected. Alternatively, the subtitle teletext signalling may be set to “None” or “Available”, as appropriate.

*Sub\_Img*

The ARC 130S will automatically provide the output signalling from the input signalling if Auto is selected. Alternatively, it can be set to “None”, Inside Image active or Outside Image active.



**AFD Dat****Scan**

This sets the bottom 3 bits of the video index and enhanced line 23 signal to be 4:3 or 16:9 as desired.

*Note that this only takes immediate effect if the Mode is set to FORCED.*

See Output Setup\Mode above.

**AFD**

This sets the **AFD** data of **AFD** spec video index and enhanced line 23 outputs.

Selections available are:

Coded

4:3

16:9

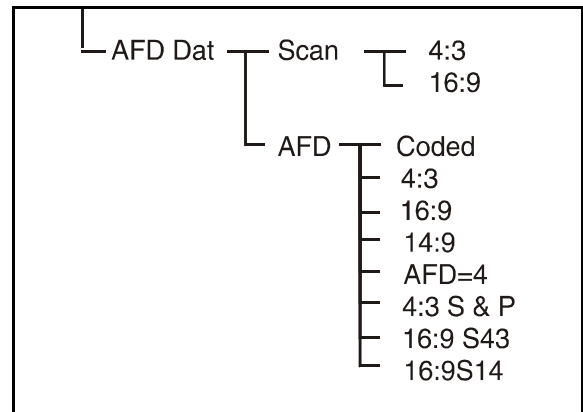
14:9

**AFD=4**

4:3 S&P

16:9 S4:3

16:9 S14



Note that this only takes immediate effect if the Mode is set to FORCED.

See Output Setup\Mode above.

Note that **AFD** value 4 is specified as reserved but, it is provided here in case it is allocated a meaning at some future time.

**ETSI PG**

This allows the user to program the ARC130S action in when it receives the stated incoming line 23 (ETSI) signal.

Select ETSI PG and select from the list the line 23 signal that you want to activate the selected display.

Select Line 23 4:3F  
 Select Line 23 14:9LC  
 Select Line 23 14:9LT  
 Select Line 23 16:9LC  
 Select Line 23 16:9LT  
 Select Line 23 >16:9L  
 Select Line 23 14:9S&P  
 Select Line 23 16:9 F

“LT” refers to Letterbox Top and “LC” refers to Letterbox Centre, “S&P” refers to Shoot and Protect and “F” refers to Full Frame.

When the particular line 23 signal is received, the ARC130S will recall the display settings, produce the appropriate output aspect ratio and set the line 23 output and video index signal.

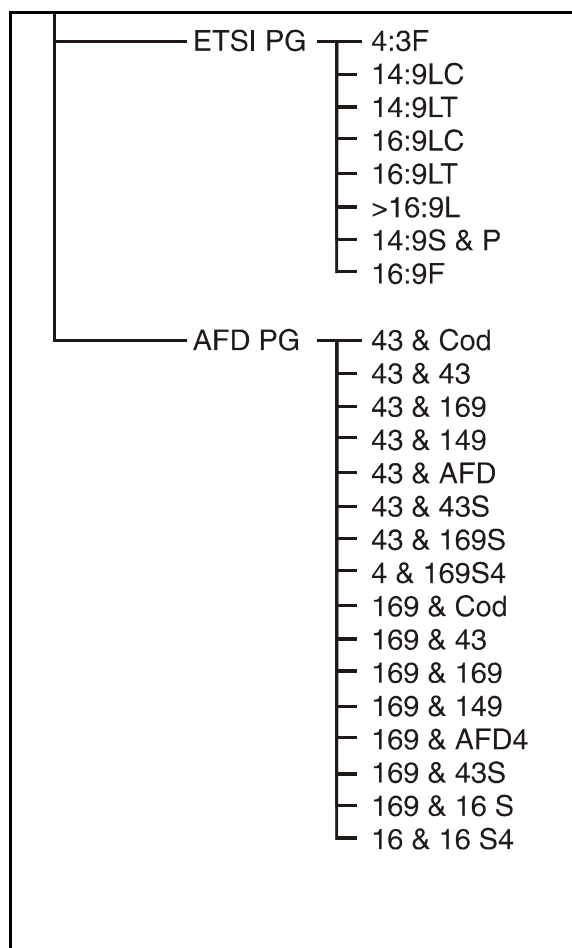
**AFD PG**

This allows the user to program the ARC130S action when it receives the stated incoming video index or enhanced line 23 signal.

Selections available are:

4:3 & Cod  
 4:3 & 4:3  
 4:3 & 16:9  
 4:3 & 14:9  
 4:3 & **AFD**  
 4:3 & 4:3 S  
 4:3 & 16:9 S  
 4:3 & 16:9 S4  
 16:9 & Cod  
 16:9 & 4:3  
 16:9 & 16:9  
 16:9 & 14:9  
 16:9 & ARD4  
 16:9 & 4:3 S  
 16:9 & 16:9 S  
 16:9 & 16:9 S4

When the particular line 23 signal or video index is received, the ARC 130S will recall the display settings, produce the appropriate output aspect ratio and set the line 23 output and video index signal.



*Note that if the incoming aspect ratio conversion source is set to L23 AFD or L23 ETSI then it will program the line 23 AFD memories.*

If the Auto source is set to video index then it will program the video index memories.



## MEMORY

This allows you to store or recall display settings in 12 separate memories. From the Home Screen, press ENT and scroll to Memory. Press ENT and scroll between Store and Recall. Press ENT on the selected function.

**Store** allows you to select the memory store you wish to retain the current settings in. To store, make sure that the display settings are the way you want them to be, scroll to the store number you are going to use and then press ENT. Keep a careful record of the picture the settings are to be used with.

**Recall** allows you to recall one of the user memories. To recall, refer to your record of the memory stores, scroll to the required user number and then press ENT; the picture format will immediately change according to the stored parameters.

*Note that the state of the Bypass button is also kept in the user memories. If a user memory is stored with Bypass turned ON, whenever that memory is recalled Bypass will be activated.*

*This means that whenever a preset aspect ratio conversion is selected, Bypass is turned OFF.*

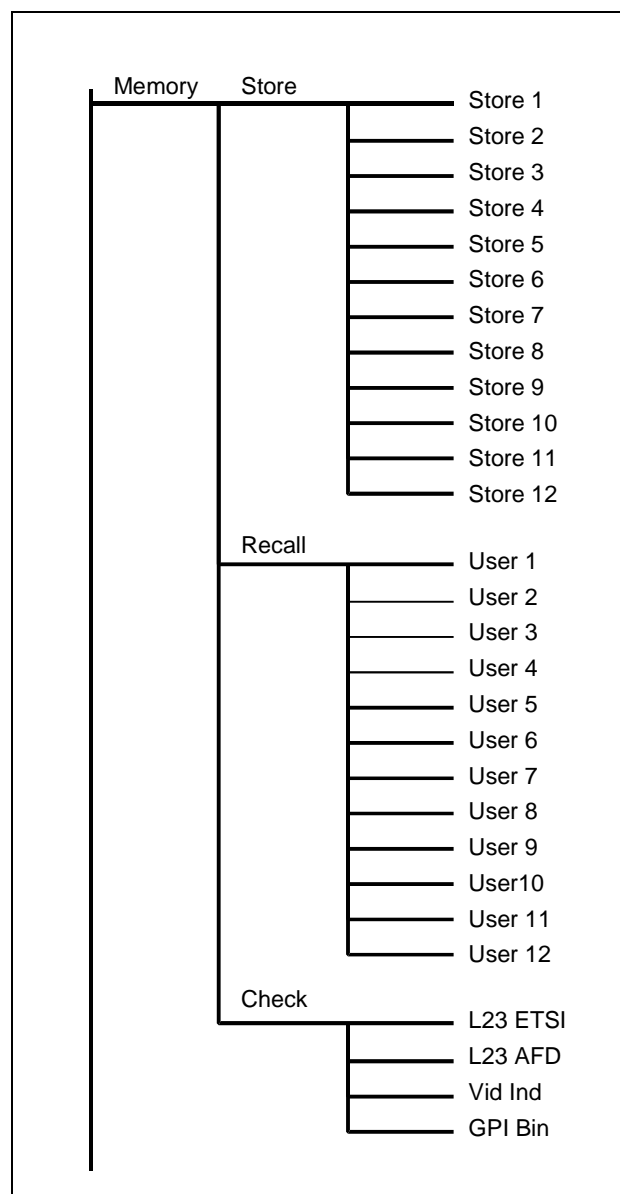
*This feature allows users of the GPI to turn on the Bypass mode via the GPI port.*

See Appendix page 4.37 for a list of the parameters stored in the memories.

**Check** allows the user to recall the Auto aspect ratio memories without having to apply the relevant auto widescreen signalling or GPI contact closure.

**L23 ETSI** – Selecting this presents the user with a list of the eight possible incoming line 23 ETSI codes. When one of these eight codes is selected then, the auto memory corresponding to that line 23 code is recalled. Thus the ARC is put in the same mode as it would have been if Auto line 23 ETSI input was selected and, that particular widescreen signal was present on the input video.

**L23 AFD** – Selecting this presents the user with a list of the sixteen possible incoming line 23 AFD codes. When one of these sixteen codes is selected then, the auto memory corresponding to that line 23 code is recalled. Thus, the ARC is put in the same mode as it would have been if Auto line 23 AFD input was selected and, that particular widescreen signal was present on the input video.



**Vid Ind**– Selecting this presents the user with a list of the sixteen possible incoming video index AFD codes. When one of these sixteen codes is selected then, the auto memory corresponding to that video index code is recalled. Thus, the ARC is put in the same mode as it would have been if Auto video index input was selected and, that particular widescreen signal was present on the input video.

**GPI Bin**– Selecting this presents the user with a list of the sixteen possible incoming GPI Binary codes. When one of these sixteen codes is selected then, the auto memory corresponding to that GPI Binary value is recalled. Thus, the ARC is put in the same mode as it would have been if Auto GPI Binary input was selected and, that particular Binary GPI value was present on the GPI input.

## SETUP

This allows you to select the ARC130S configuration menu. From the Home Screen, press ENT and scroll to Setup. Press ENT and scroll to select the function you require. Then press ENT again.

**Bypass** allows you to select whether the video is interpolated or whether it is passed straight through the unit (but with the normal unit delay). Each time you press ENT, the message toggles between NoBypass and Bypass; the default is NoBypass.

**Clip** allows you to turn the internal clipper on or off. The clipper limits the 10-bit data to 940 for white and 64 for black. Each time you press ENT, the message toggles between Clip Off and Clip On.

**Freeze** allows you to turn the video freeze function on and off. Each time you press ENT, the message toggles between NoFreeze and Freeze.

**Gamut** Turns on or off the colour gamut checking system. When On it ensures that the colour values are legal.

**Ip Loss** controls the response to the loss of the input video.

Black: the ARC130S output cuts to black when the input is lost

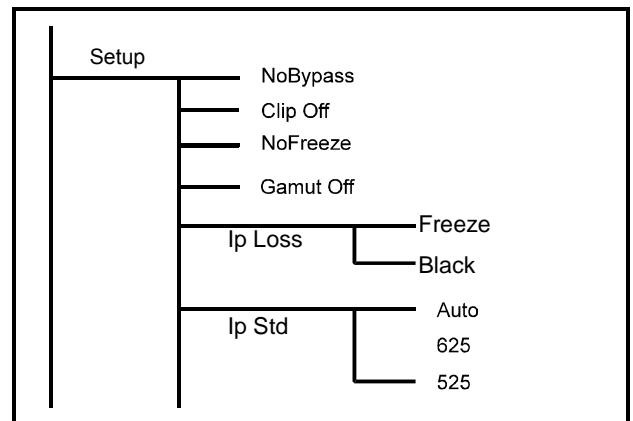
Freeze: the ARC130S output freezes when the input is lost

**Ip Std** allows you to select the incoming video standard.

Auto: automatically detects the incoming video standard.

625: forces the ARC130S input to the 625/50 standard.

525: forces the ARC130S input to the 525/59.94 standard



## Modes

### Pair 1-2, Pair 2-1

This selects the way the input video fields are paired before the application of the two-field pairing mode filter (see above).

If Pair 1-2 is selected then field 1's are grouped with the following field two.

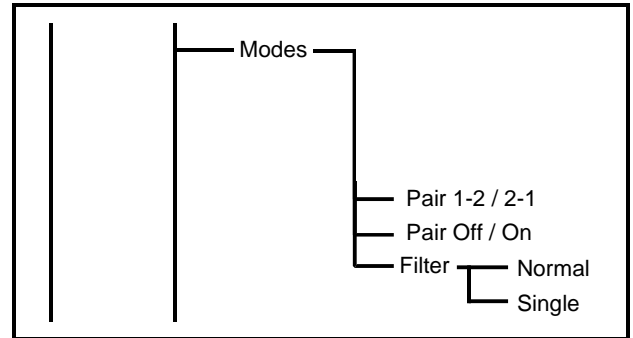
If 2-1 is selected then field 2's are grouped with the following field 1's.

### Pair Off/On

Turning Pairing mode On causes the ARC to pair up the incoming video fields into frames before applying a two field vertical temporal aperture.

If a user has material that has all the programme cuts on field 1's, then selecting Pair As 1-2 (see below) will ensure that the interpolation never bleeds across programme cuts.

If the material has all cuts on field 2's then selecting Pair As 2-1 will ensure that there is no interpolation across cuts.



The **Filter** function allows two aperture filters to be selected.

- Normal
- Single

Normal = uses the normal multi-field video aperture

Single = uses a single field aperture.

The Normal aperture will produce better results than the Single field aperture. However in some special cases (e.g. programme material containing DVE moves or scrolling captions) a single field aperture may be preferred.

### Process

Selects the filtering applied in the ARC130S .

**V & H:** This is the normal operating mode. Both vertical and horizontal size and position control is available.

**H only:** Horizontal processing only. Control of only horizontal size and position is available. No vertical or temporal filtering is applied.

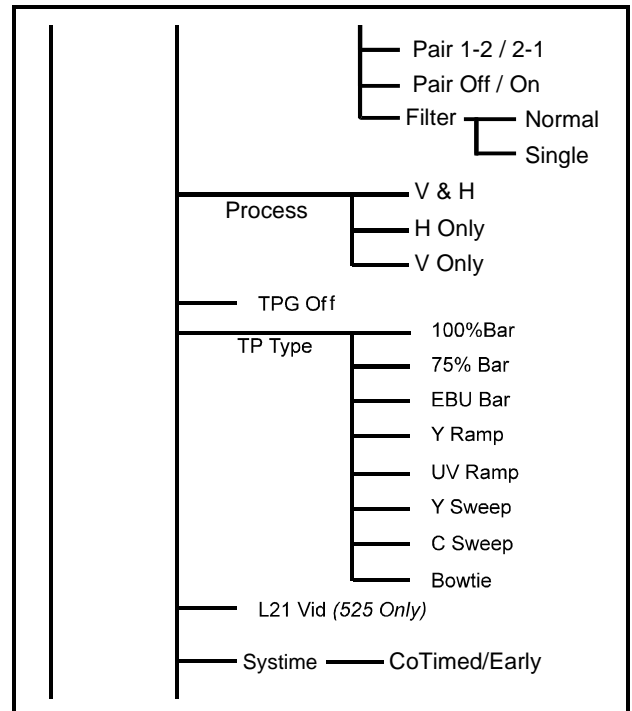
**V only:** Vertical processing only. Control of only vertical size and position is available. No horizontal filtering is applied.

**TPG Off** allows you to turn on and off the internal test pattern generator, the pattern being determined by the TP Type selection. Each time you press ENT, the message toggles between TPG Off and TPG On.

**TP Type** allows you to select the test pattern that will be produced when the internal TPG is switched on. From the Home Screen, press ENT and scroll to Setup. Press ENT and scroll to select TPG Type. Then press ENT again.

Scroll to the pattern type you require and press ENT. The patterns are digitally generated to exact levels; to preserve their integrity there is no adjustment.

**Line 21** (525 only) allows you to select whether line 21 is a video line or a VITS line (usually closed captioning). Each time you press ENT the message toggles between L21 Vid and L21 Capt.



## Systime

In order to improve the system timing a new mode has been introduced. This mode ensures that output line 23 and video index signalling occurs on the same field that the video transition occurs. It also ensures that GPI contact closures that are co-timed with the video, that they wish to change, are properly timed. In earlier releases the GPI closure had to be done in advance of the desired transition.

This new timing model is selected by default with version A14 and later software. Existing users of the ARC who wish to upgrade to this version of software but have an existing remote control system in place may select the old timing model if they desire. This ensures compatibility between the new ARC software and the users existing infrastructure.

Selections are **CoTimed** (for new model) or **Early** (for old model)

This function may also be entered via RollCall.

The **Trans** menu controls the type of transition between display sizes that the ARC performs.

### Trans – Period

This sets the time that the ARC takes to move between one picture size and the next when the ARC is in Slew mode (see below). If Update is set to F1 and F2 (see Setup- Update menu below) then the time is in video fields otherwise it is in Frames. The default period is one field

### Trans -- Type

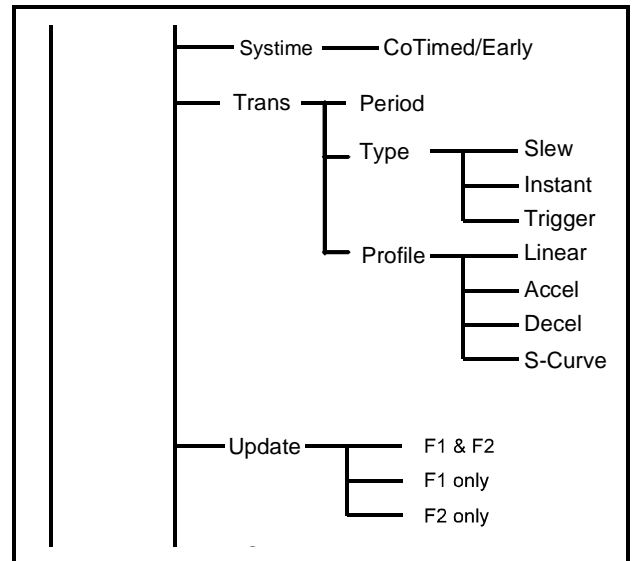
This sets the type of transition that the ARC will perform.

#### Trans -- Type -- Slew

In Slew mode the ARC moves gradually from one picture size to the next taking the time set on the Trans – Period menu and following the profile set on the Trans – Profile menu.

#### Instant

In instant mode the ARC cuts directly from one picture size to the next. Note that Instant mode is the same as Slew mode with the duration set to one field.



### Trigger

In Trigger mode, the ARC will slew from one picture size to the next using the duration and profile set on the Trans menus. However, the transition will not be started until a trigger command is sent on the RS-422 remote control channel. This is useful when remote controlling the ARC as the display parameters can be sent in advance of the transition and, only the trigger command needs to be sent in real time.

Warning, if the ARC is put in Trigger mode then it will not react to front panel commands which affect the picture display parameters (size, aspect, pan and Pos).

### Trans -- Profile

This sets the shape of the transition that the ARC will perform.

#### Trans -- Profile -- Linear

In Linear mode the ARC moves linearly from one picture size to the next.

#### Accel

In accelerate mode the ARC starts the transition with a low rate of picture size change from field to field and gradually increases the rate of change.

#### Decel

In decelerate mode the ARC starts the transition with a high rate of picture size change from field to field and gradually decreases the rate of change.

#### S-Curve

In S-Curve mode the ARC starts the transition slowly, then increases the rate of change then reduces the rate of change at the end of the transition.

### Update

This allows you to select whether a change in output display parameters occurs at field or frame rate. This is significant if line 23 signalling is used (this signal is only present once per frame). If the ARC130S is in the Auto mode and line 23 signalling is set to Auto output, when a change in aspect ratio is signalled at the input, it is preferable that the output video change and the output line signalling occur together. This may not be the case due to internal vertical genlock timing or timing of the external reference. To ensure that the video change and output signalling occur together it is recommended that Update is set to "Field 1" when in the Auto mode.

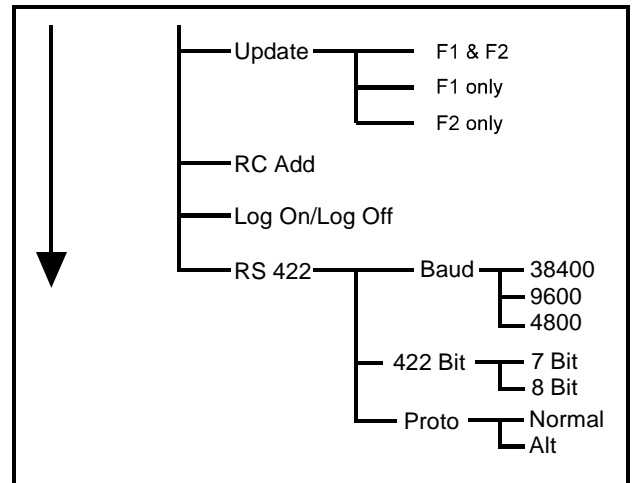
If "F1 & F2" is selected, the video at the output will change at the first available field boundary after a button has been pressed or a remote control command has been received.

If "F1 only" or "F2 only" is selected the video at the output will only change at the start of the appropriate output field type after a button has been pressed or a remote control command has been received.

### RC Add

When this item is selected the ARC displays the RollCall address of the unit in Hexadecimal. Note that the address cannot be changed using this menu entry, it can only be changed using the rotary switches as described in Section 3.

**Log On** – selecting this menu item toggles between Log On and Log Off. This item turns On and Off the RollCall Log server function in RollCall network applications.



### RS422

This allows the RS422 communications function to be set up.

**Baud** controls the Baud rate used on the RS422 remote control channel.

The rate may be set to any of the following:

38400  
9600  
4800

*Note that if the ARC is to be controlled by a Snell & Wilcox ARC remote control unit then the Baud rate must be set to 38400 Baud.*

**422 Bit** – this sets the number of data Bits used on the RS-422 remote control link when the Normal remote control protocol is in use (see below).

*Note that if the ARC is to be controlled by a Snell and Wilcox ARC remote control unit then this must be set to 7 Bits.*

**Proto** – this selects the remote control protocol in use on the RS 422 remote control link. **Normal** is the default protocol and this provides control of all parameters of the ARC.

If **Alt** is selected an alternate protocol is active. This is for use with Philips automation systems that are unable to support the rich feature set of the ARC.

This protocol only provides a limited number of commands and is described in more detail on page 4.53.

The full Snell and Wilcox protocol is widely used and is freely available from Snell and Wilcox.

## VITS

This allows you to control the blanking of the vertical interval lines. Note that for 625/50 operation the lines are 7-22 and 320-335, and for 525/59.94 operation the lines are 10-20 (and line 21 if set up to L21 Capt, as above) and 272-282. From the Home Screen, press ENT and scroll to VITS. Press ENT and scroll to select the function you require. Then press ENT again.

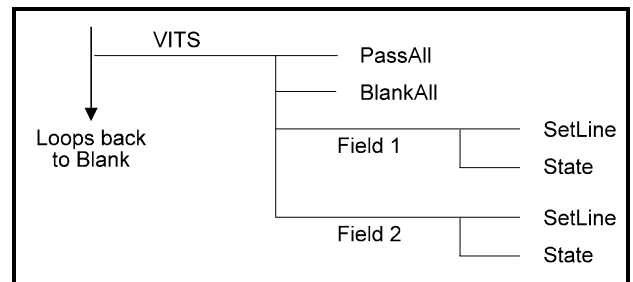
**PassAll** passes all the VITS lines through the ARC130S untouched. When selected and ENT is pressed, the message “Done” appears.

**BlankAll** blanks all the VITS lines. When selected and ENT is pressed, the message “Done” appears.

**Field 1** allows you to selectively pass/blank field 1 vertical interval lines. Similarly, **Field 2** allows you to selectively pass/blank field 2 vertical interval lines.

Setline: selects which vertical interval lines of the appropriate field are to be blanked/passed.

State: turns on and off the blanking for the lines set in Setline. Pressing ENT toggles the message between “Pass” and “Blanked”.



## Abbreviated Explanation of Aspect Ratio Technical Codes for Video and Picture Sources

(For full details see Section 6)

These codes can be used to describe the aspect ratios used when graphics or video sources are composed or generated. They describe the image and the raster ratios.

### Code Specification:

Code format is thus: **AABCCD**

Where **AA** is the first parameter, **B** is the second etc.

The four parameters of the code must be used in the order specified. Not all parameters have to be used if not appropriate or known, however **B** (The Display Format) should be present to prevent ambiguity.

#### **AA Active Image Aspect Ratio - Number(s)**

Aspect Ratio of Active Image Area expressed as a two digit abbreviated numeric value where the comparison ratio is against a height of 9. Active Image area is the part of the raster / bitmap that contains picture information. 12 is normally used for 4 by 3 (12 by 9).

*ie. Two digit number giving the aspect ratio of the picture area that viewers are interested in, that is neglecting any areas of continuous and static black due to letter-boxing or pillar-boxing. Numbers describing ratios seen in use at present are: 12, 14, 15 (Super 16), 16, 17 (1.85:1), 21 (2.35:1), 24. Thus 14 : 9 becomes **14**.*

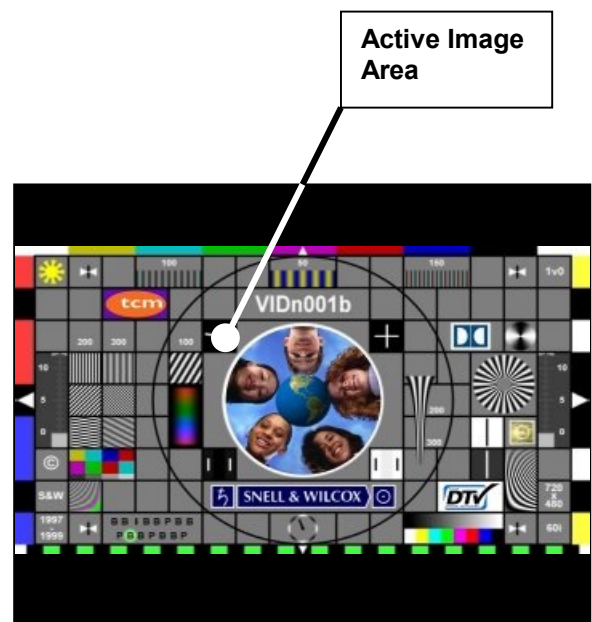
#### **B Display Format - Letter**

The visual effect of the image and display raster aspect ratios combined. Abbreviated as an initial.

<b>P</b> for pillar-box.	That is full height but with black down the sides.
<b>L</b> for letter-box.	That is full width with black top and bottom.
<b>F</b> for full frame.	Display and Image aspect ratios are the same.

*i.e. if it's purely in letter box presentation put in an **L** etc. e.g. 14L12A - "14 by 9 letterbox for..". This letter confirms what the pictures look like and separates the two ratio numbers.*

*Note: Letter **A** has been proposed for material converted an Anamorphic presentation - that is the image is designed to be displayed distorted. This can be as a result of stretching a picture to fit a given display shape whilst avoiding cropping.*





**CC Raster aspect ratio - Number(s)**

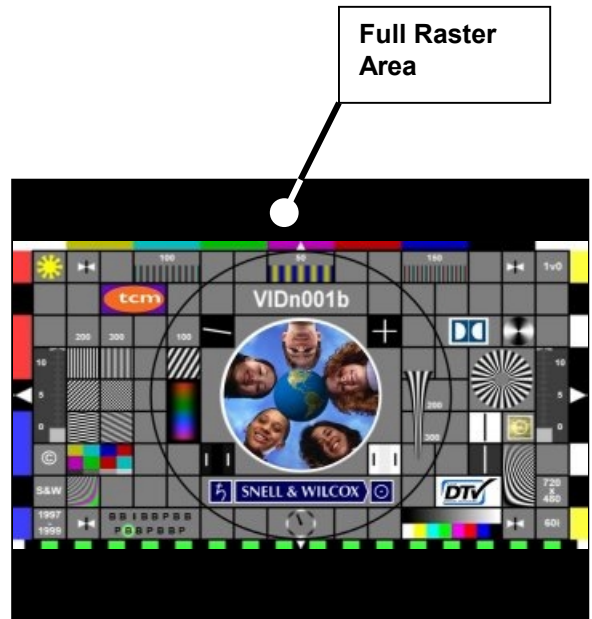
Aspect Ratio of the full raster when correctly displayed expressed as a two digit abbreviated numeric value where the comparison ratio is against a height of 9. 12 is used for 4 by 3 (12 by 9)

*i.e. Two digit number(s) giving the aspect ratio of entire picture / raster / graphics bitmap, including all the black of any Letterbox or Pillarbox area, that gives a correctly displayed image.*

*Numbers describing ratios seen in use at present are 12, 14, 15 (Super16), 16, 17 (1.85:1), 21 (2.35:1Cinemascope), 24.*

*e.g. A 16 : 9 full height "anamorphic" raster is shown as 16.*

A request for material suitable for 16 by 9 TX could just be "supply it in F16 format".



*Examples of common aspect ratios expressed as two digit numbers using this notation.*

Aspect Ratio	Two Digit Number
4:3	12
14:9	14
15:9	15
16:9	16
1.85:1	17

Generally:

If the aspect ratio is expressed as: -

$A : B$  (width to height)

Then the two digit number  $N$  representing the comparison ratio against a height of 9 will be given by

$$N = \frac{9}{B} \times A$$

or by transposing

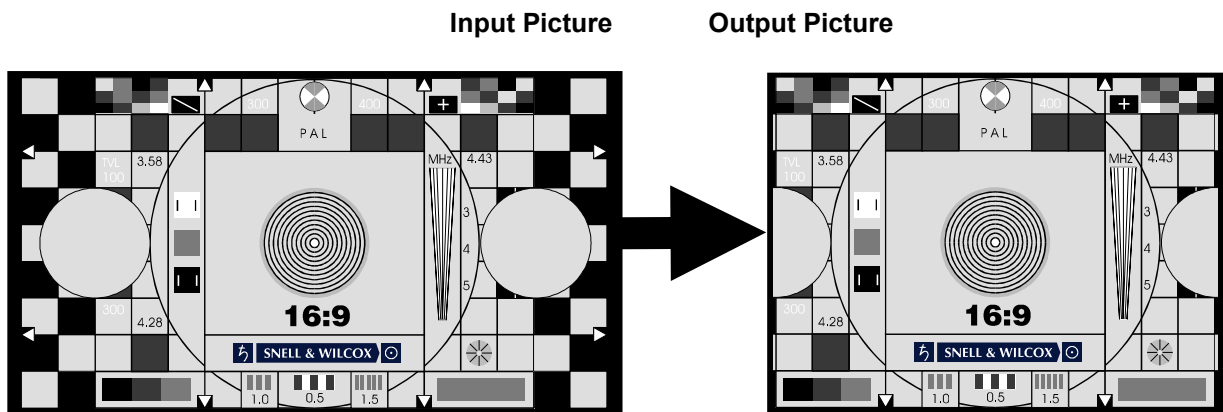
$$B = \frac{9}{N} \times A$$

and

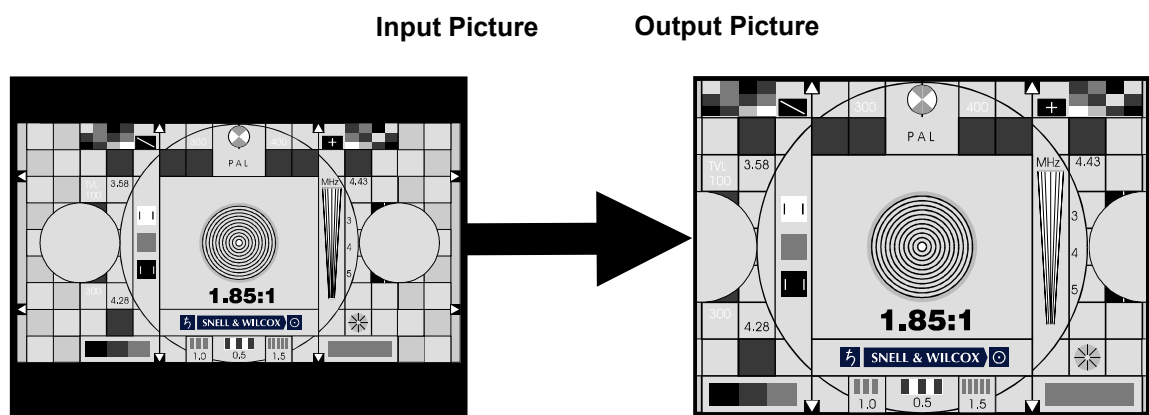
$$A = \frac{B}{9} \times N$$

## PRESET ASPECT RATIO SELECTIONS

Front panel Designation	BBC Notation	Full Description	Aspect Value	Size Value
1.77F>FH	16F16 > 12F12	16:9 picture to full height 4:3 picture for presentation on a 4:3 screen (left hand and right hand edges of original 16:9 image are cropped)	1.333	1.000



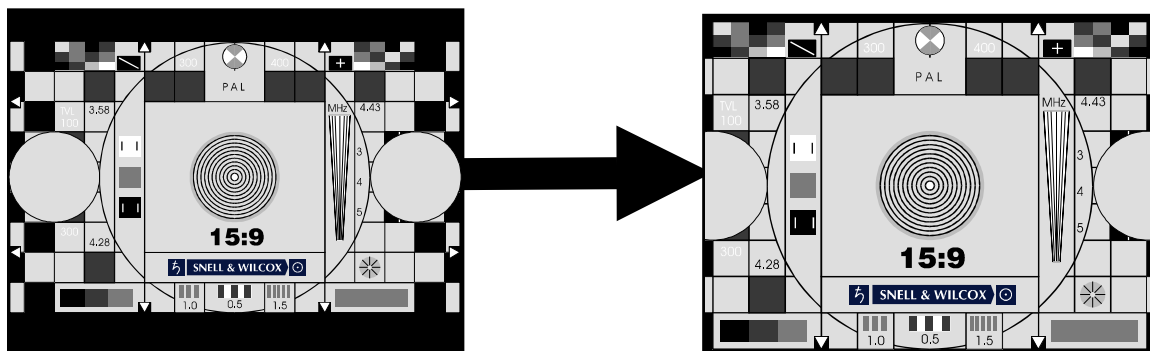
Front panel Designation	BBC Notation	Full Description	Aspect Value	Size Value
1.85L>FH		1.85:1 Letterbox picture to full height 4:3 picture with left hand and right hand edges of original 1.85:1 image cropped	1.000	1.388



Front panel Designation	BBC Notation	Full Description	Aspect Value	Size Value
1.66L>FH	15L12 > 12F12	15:9 letterbox picture to full height 4:3 picture with left hand and right hand edges of original 15:9 image cropped	1.000	1.250

Input Picture

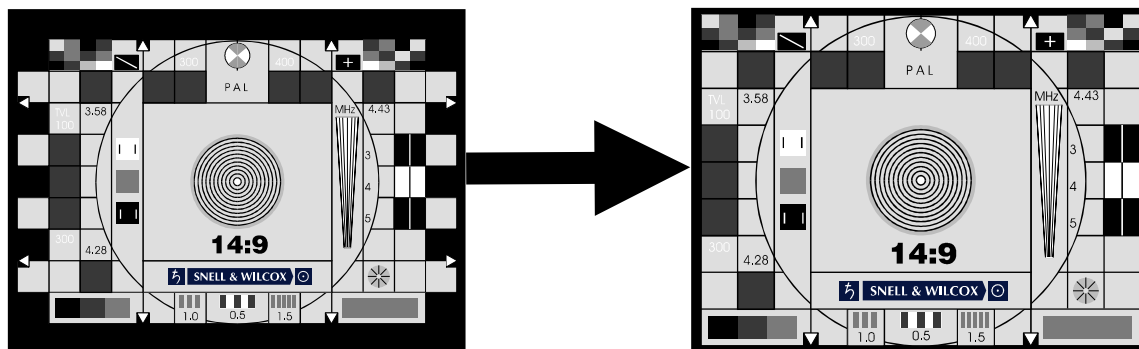
Output Picture



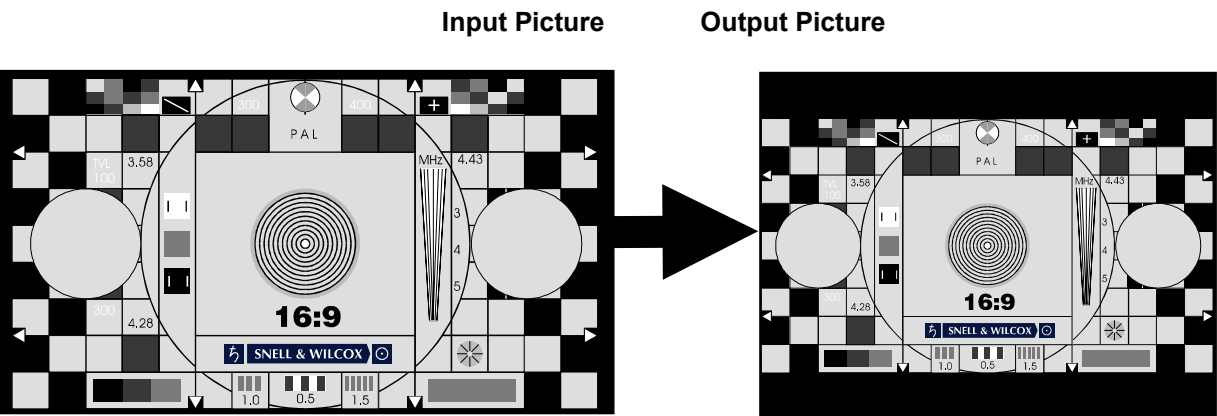
Front panel Designation	BBC Notation	Full Description	Aspect Value	Size Value
1.55L>FH	14L12 > 12F12	14:9 letterbox picture to full height 4:3 picture with left hand and right hand edges of original 14:9 image cropped	1.000	1.167

Input Picture

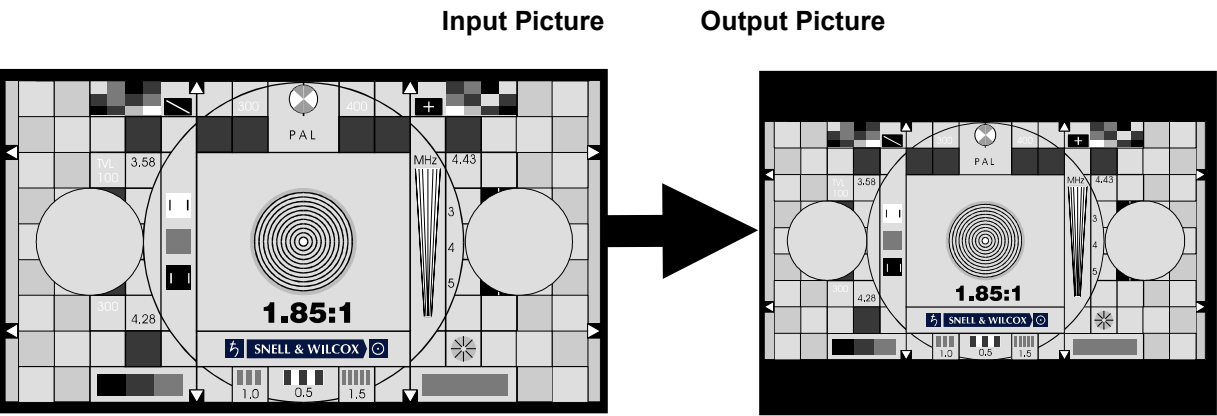
Output Picture



Front panel Designation	BBC Notation	Full Description	Aspect Value	Size Value
1.77F>LB	16F16 > 16L12	16:9 Anamorphic picture converted to 16:9 letterbox picture for presentation on 4:3 screen (black bars above and below image)	1.333	0.750



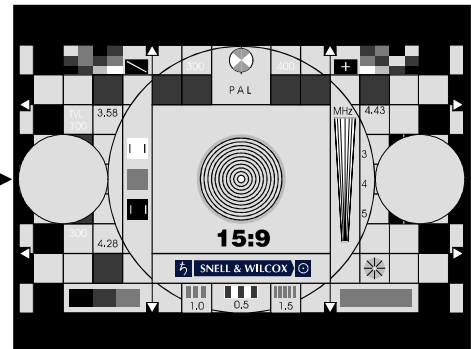
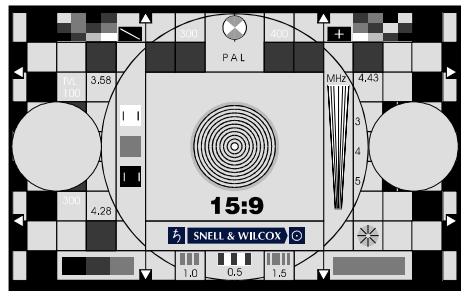
Front panel Designation	BBC Notation	Full Description	Aspect Value	Size Value
1.85F>LB		1.85:1 Anamorphic picture converted to 1.85:1 letterbox picture for presentation on 4:3 screen (black bars above and below image)	1.388	0.721



Front panel Designation	BBC Notation	Full Description	Aspect Value	Size Value
1.66F>LB	15F15 > 15L12	15:9 Anamorphic picture converted to 15:9 letterbox picture for presentation on 4:3 screen (black bars above and below image)	1.250	0.800

Input Picture

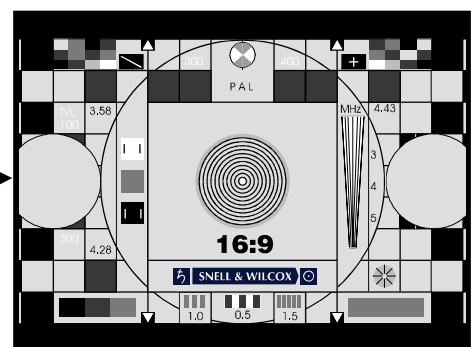
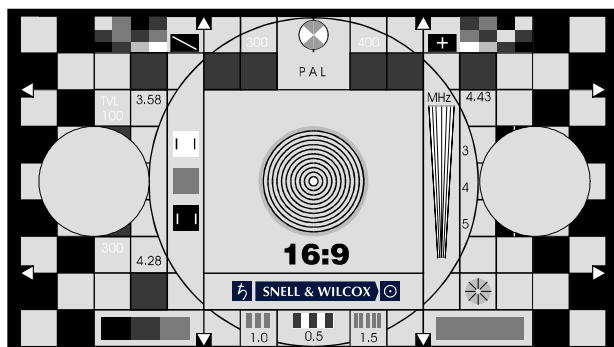
Output Picture



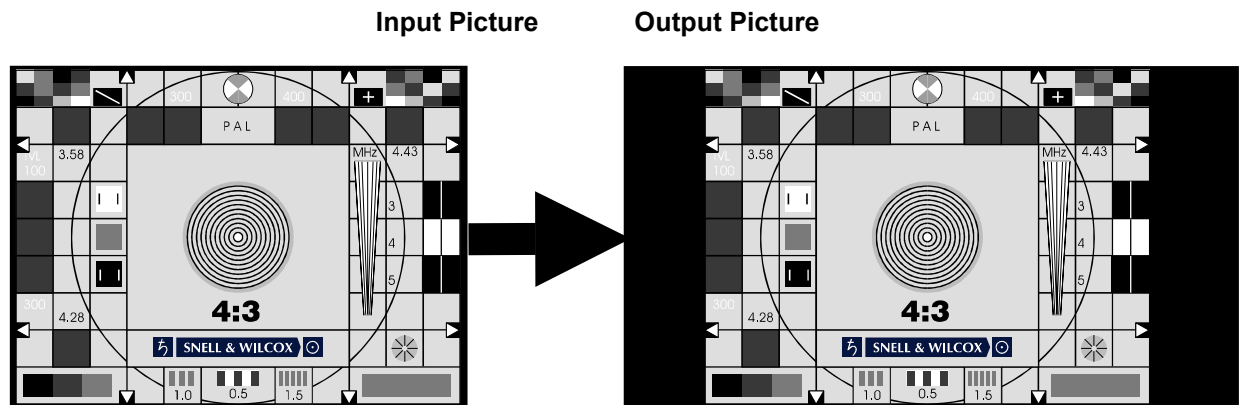
Front panel Designation	BBC Notation	Full Description	Aspect Value	Size Value
1.77F>1.55L	16F16 > 14L12	16:9 Anamorphic picture converted to 14:9 letterbox picture for presentation on a 4:3 screen (black bars above and below image and right hand and left hand edges of picture slightly cropped)	1.333	0.857

Input Picture

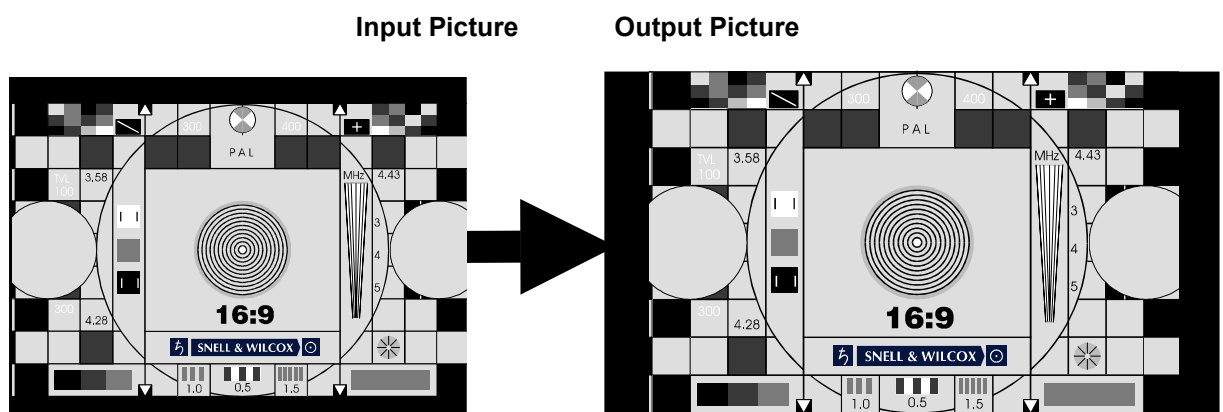
Output Picture



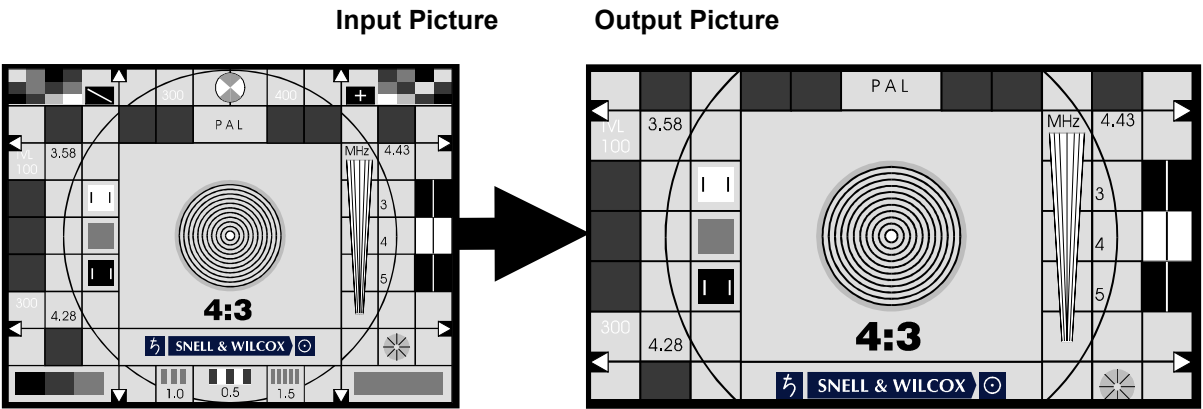
Front panel Designation	BBC Notation	Full Description	Aspect Value	Size Value
4:3>Cur	12F12 > 12P16	4:3 image converted to 4:3 pillarbox/curtains image in 16:9 anamorphic. (4:3 horizontally squeezed image with black bars to left and right of output)	0.750	1.000



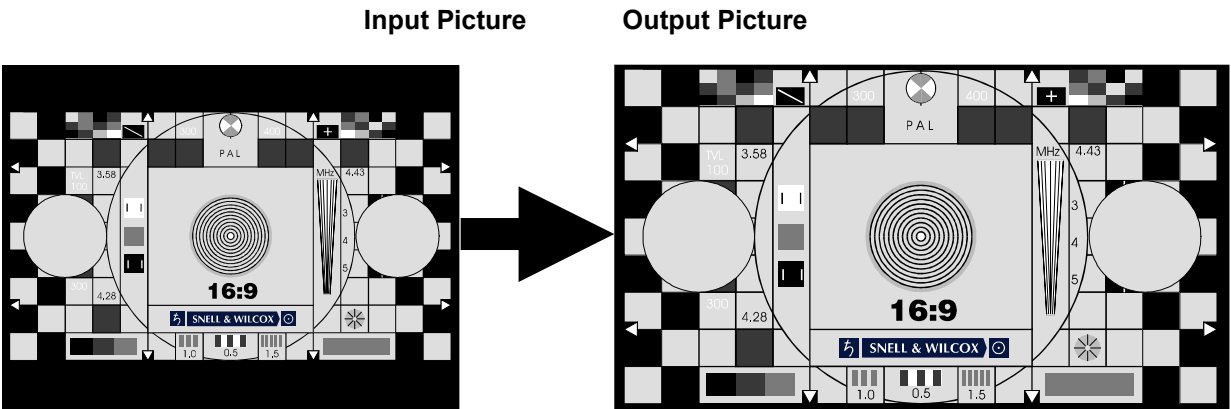
Front panel Designation	BBC Notation	Full Description	Aspect Value	Size Value
1.55>Cur	14L12 > 14P16	14:9 letterbox picture in 4:3 converted to 14:9 pillar-box/curtains image in 16:9 anamorphic (14:9 horizontally squeezed image with 1:9 black bars to left and right of output)	0.750	1.167



Front panel Designation	BBC Notation	Full Description	Aspect Value	Size Value
4:3>FW		4:3 image anamorphically squeezed and scaled up to fill full 16:9 width. Top and bottom of original 4:3 image cropped at output	0.750	1.333



Front panel Designation	BBC Notation	Full Description	Aspect Value	Size Value
1.77L>1.77F	16L12 > 16F16	16:9 letterbox in 4:3 converted to 16:9 anamorphic full height image	0.750	1.333



## APPENDIX – Video Index and Enhanced Line 23

The ARC130S can read incoming video index signals and output its own video index signal. Video index is a signal embedded in the D1 output stream that can be used to convey aspect ratio information. The basic version of video index is described in SMPTE document RP186. An enhanced version of video index incorporating more aspect ratio information has been introduced in the United Kingdom for control of MPEG encoders. The ARC130S supports both forms of video index and, they are referred to as SMPTE186 and AFD Spec' version throughout. (AFD is Active Format Descriptor). The serial data format of the video index is described in SMPTE document SMPTE125M-1995.

In the United Kingdom, a modified version of line 23 signalling which allows the embedding of the same information as that in AFD spec Video Index signals has been defined. The ARC130S supports this AFD spec version of line 23 at both its input and output. The new line 23 will be referred to as L23 AFD and the previous version of line 23 as L23 ETSI throughout.

### BACKGROUND INFORMATION ON VIDEO INDEX

The original SMPTE RP186 video index scheme includes in the very first data byte (Class 1.1 data Octet 1) a scanning system field. This can signal either 4:3 or 16:9 using the bottom 3 bits of the data byte as shown below.

Octet Value	Meaning	B2	B1	B0
0	no information	0	0	0
1	525/59.94 4:3	0	0	1
2	625/50 4:3	0	1	0
3	Reserved	0	1	1
4	Reserved	1	0	0
5	525/59.94 16:9	1	0	1
6	625/50 16:9	1	1	0
7-255	Reserved	1	1	1

Within Europe an extension to this data byte has been defined and is known as the ARDSPEC version. AFD being Active Format Descriptor. This retains the meaning of the bottom 3 bits of the data byte as 4:3 or 16:9 but in addition, it defines the meanings of the next 3 bits as follows.

Active format	Intended aspect ratio of active region	B5	B4	B3
0	Active region is same as coded frame	0	0	0
1	4:3	0	0	1
2	16:9	0	1	0
3	14:9	0	1	1
4	Reserved for future use	1	0	0
5	4:3 with shoot-and-protect 14:9 centre	1	0	1
6	16:9 with shoot-and-protect 14:9 centre	1	1	0
7	16:9 with shoot-and-protect 4:3 centre	1	1	1

The enhanced version of Line 23 (L23 AFD) basically embeds the same information in the line 23 data. i.e. the Scanning system and AFD fields. In addition, it provides four User bits.



The ARC130S can read incoming aspect ratio signalling and output it. This means that the aspect ratio conversion it performs can be automatically controlled by the incoming video signalling. It is possible to program the action that the ARC takes for each of the incoming signalling values. The parameters that are stored when the signalling is programmed are as follows:

1. Output picture Size.
2. Output picture Aspect ratio.
3. Output picture Horizontal position.
4. Output picture Vertical position.
5. Output line 23 signal.
6. Output video index signal.
7. Bypass Mode setting.

***These parameters are also stored for the User Display Memories and are recalled when a User Memory is selected.***

Both line 23 and video index outputs can be turned on simultaneously. Note that if the line 23 output mode is set to AFD then the line 23 output data will be the same as that being output on the video index signal. It is however possible to program the Line 23 AFD and Video Index inputs independently.

The video index information is inserted on line 11 and 324 for 625 line systems and lines 14 and 277 for 525 line systems.

## PROTOCOL

The ARC130S software supports a second RS 422 remote control protocol. This has been done so that the ARC can be controlled by Philips automation systems that are unable to support the full command set of the Snell & Wilcox ARC's.

If the alternate protocol is selected the RS 422 link is automatically switched to eight data bits, one stop bit and no parity. The baud rate is selectable from the ARC menus and may be set to 38400, 9600 or 4800 baud. Note that the RS 422 data bits menu item only controls the number of RS 422 data bits in use when the default Snell & Wilcox protocol is in use.

The protocol accepts messages of the form: -

*<stx><address><command><etx>*

Where: -

*<stx>* = One byte with hexadecimal value 0x02. This indicates the start of a message packet.

*<address>* = One byte representing the ARC address. The MSB is always set to one. This byte can take a value in the range 0x81 to 0xE3 representing addresses one to ninety-nine (decimal). The ARC checks that the value is in this range and will respond to any valid address. Commands with an address outside the valid range are ignored.

*<command>*= One byte which represents the desired command. The MSB is always one. See table below of valid command numbers.

*<etx>* = One byte with hexadecimal value 0x03. This indicates the end of a message packet.

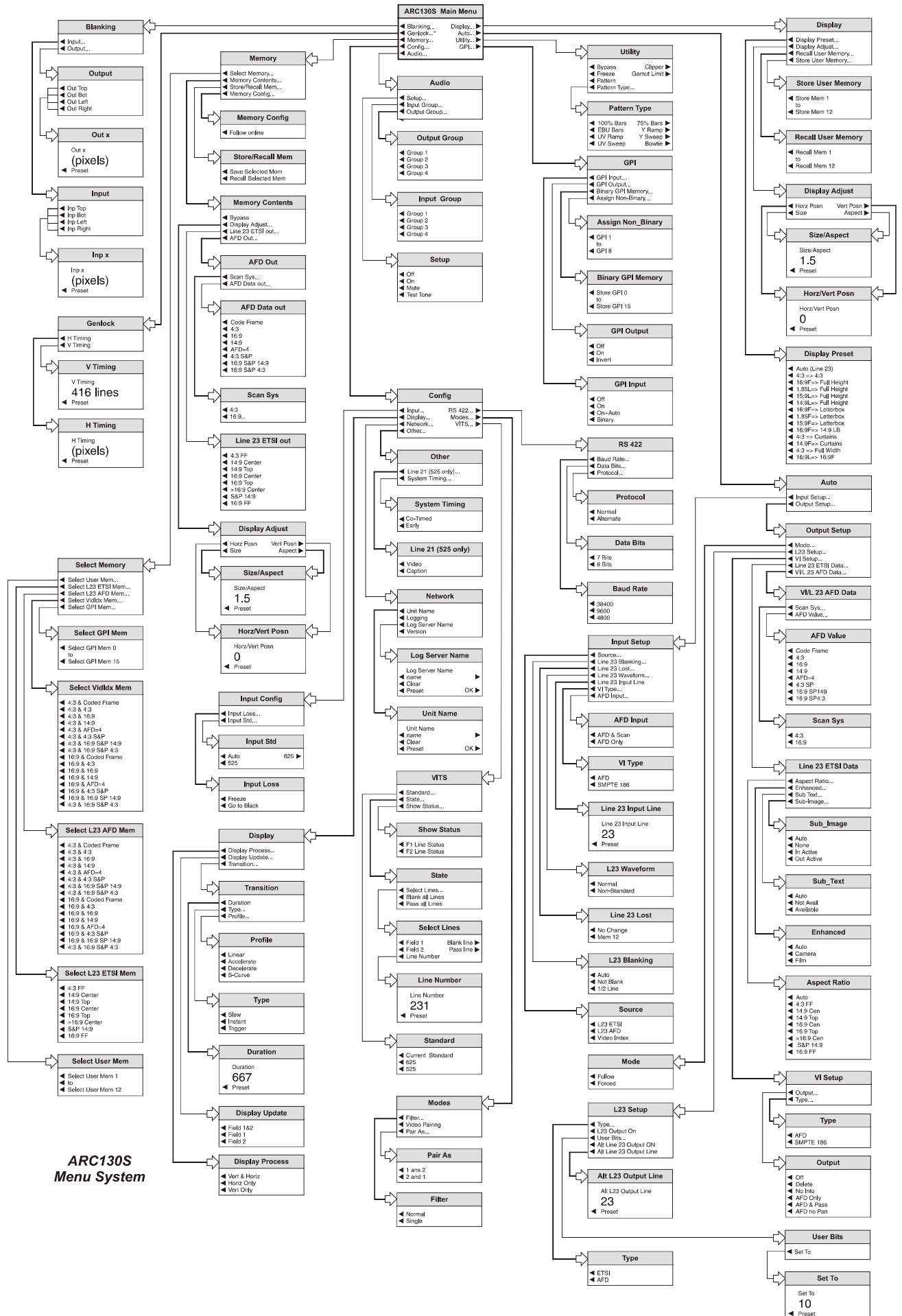
The accepted commands are either a Poll command or a Recall preset command.

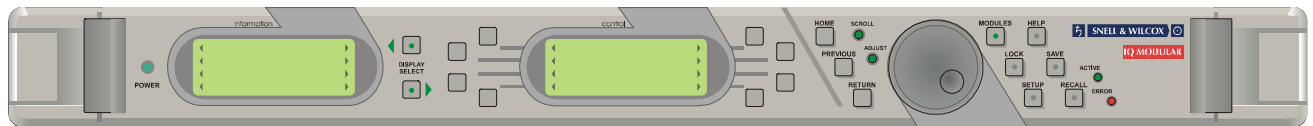
If a Poll command is received then the ARC will respond with an *<ACK>* byte (0x04) if the ARC is available to receive messages. If a communications error occurs, a *<NAK>* byte (0x05) will be sent by the ARC.

If a Recall Preset command is received, the ARC will respond with an *<ACK>* byte (0x04) if the message is received and the Preset is updated. If a communications error occurs, a *<NAK>* byte (0x05) will be sent by the ARC and the Preset will not be updated.

Command Byte	Command Name	ARC Action
0x80	Poll	
0x90	Recall Preset 1	Recall User Memory 1
0x91	Recall Preset 2	Recall User Memory 2
0x92	Recall Preset 3	Recall User Memory 3
0x93	Recall Preset 4	Recall User Memory 4
0x94	Recall Preset 5	Recall User Memory 5
0x95	Recall Preset 6	Recall User Memory 6
0x96	Recall Preset 7	Recall User Memory 7
0x97	Recall Preset 8	Recall User Memory 8
0x98	Recall Preset 9	Recall User Memory 9
0x99	Recall Preset 10	Recall User Memory 10
0x9A	Recall Preset 11	Recall User Memory 11
0x9B	Recall Preset 12	Recall User Memory 12
0x9C	Recall Preset 13	Recall Auto Mode

Table - RS 422 Command Numbers





## THE ROLLCALL MENU SYSTEM

(See 'ARC130S Menu System' drawing on previous page)

All operational parameters and selections are made using a system of menus displayed in two LCD windows.

Menus are selected by push buttons and further menu selections made by rotating a spinwheel and pressing a push button.

The spinwheel also allows continuously variable parameters, e.g. Gain, to be adjusted and the setting to be seen in the LCD window.

Various specific operations may be achieved by operating dedicated push buttons.

The system may be considered structured as a set of menus and sub-menus that are displayed in the central LCD window. The left hand LCD window will display the current input/output standard selections of the unit and information messages. The DISPLAY buttons allows the information displayed to toggle between the modules current setup and more detailed data including software version etc.

The highest level menu is called the Main Menu and contains the names of the lower-level menus that may be scrolled through using the spinwheel.

The sub-menu may then be selected by pressing the push button adjacent to the arrowhead in the text line of the menu name.

This sub-menu will then be displayed in the window and will have the option of selecting another sub-menu in the same manner, or allow the adjustment of a particular parameter. Parameters enabled will appear as highlighted reverse text (white text on a black background)

*Note that the spinwheel will be operative when the LED labelled SCROLL is illuminated, indicating that a menu with more than four text lines is being displayed. Operating the spinwheel then allows the other text lines to be displayed.*

## System Overview

The ARC130S is a digital-in digital-out Aspect ratio Converter.

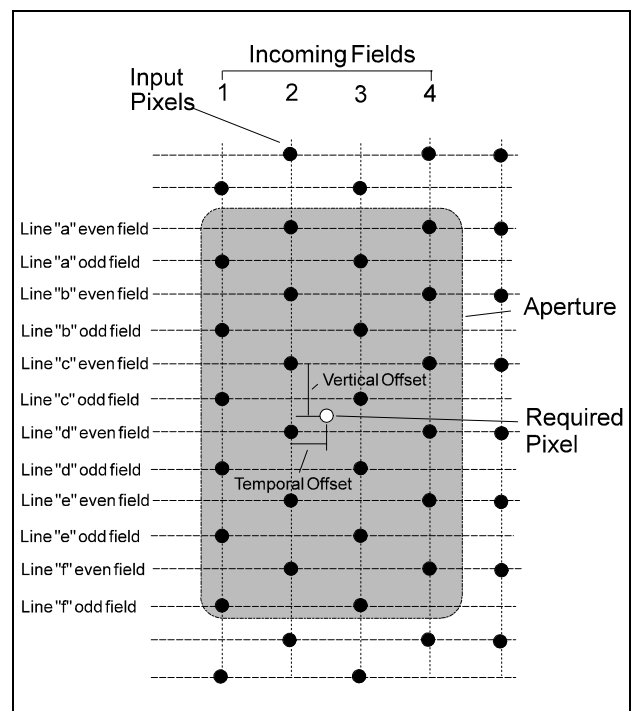
To change the aspect ratio, the picture has to be stretched or compressed in either or both the horizontal and vertical plane. To stretch or compress the picture, data has to be interpolated from adjacent pixels.

The ARC130S vertical temporal interpolation operates on four fields and six lines of the incoming video and is effectively a 24-point filter (optimised individually for every pixel point of the picture). Filtering is carried out separately for luminance and chrominance. A large horizontal filter is applied after the vertical filter.

There are two factors influencing the performance of the interpolation, one is the number of points being used in the filter, and the other is the need to carry out vertical-temporal interpolation. To explain the latter factor, six lines on one field would only access half the information in the interlace system but when we use 12 lines from a full frame, the information in the second field is displaced in time from the first field; this must be taken into account when interpolating.

In the diagram you are looking at the lines of the video structure end-on as if you are looking into the side of the CRT face while the pixels of four fields are displayed. The field offset of the required pixel from field 2 is the temporal offset and the line offset from the nearest line in field 2 is the vertical offset. The area shaded is the aperture which is centred on the required pixel position. A proportion of every pixel in the aperture is used in creating the new pixel; the proportions diminish as the distance from the required pixel increases.

In addition to changing the picture aspect ratio, the unit can read and act on line 23 signalling on the input signal and can insert line 23 signalling on the output.



## System Overview

### BLOCK DIAGRAM DESCRIPTION

Referring to the block diagram (drawing ARC130S ), the OPI card decodes the D1 serial digital video into separate luminance and chrominance data streams and feeds them to FIFO buffers, which allow for different input and output clock rates.

The data is then fed to the INT (Interpolator) card where all the required vertical/temporal and horizontal interpolation is carried out.

From the INT card the data is fed back to the OPI card where it is applied to a gamut limiting circuit. When gamut limiting is selected, any digital values that would provide illegal video values are brought within bounds.

From the gamut system, the data is output blanked and converted back to serial digital (656) format before being fed out of the unit.

Data from line 23 (625-line systems) is decoded and, when Auto is selected, provides automatic selection of the aspect ratio via the control circuits.

If the GPI interface option is fitted, an input on one of the four lines can be used to select a memorised output format and automatically set the output aspect ratio.

The syncs and timing are obtained from the video input, via a phase-locked-loop.

An internal pattern generator can be connected to the output in place of the interpolated signal.

The control circuit on the OPI card accepts inputs from the front panel, the card edge switches, or a remote panel (as well as the GPI and line 23 inputs) and provides the necessary control signals to the rest of the ARC 130S. It also provides an output which is equal to the delay through the unit.

# Aspect Ratio Technical Codes for Video and Picture Sources

Proposal Version 3.1 - see end of document for changes from previous versions 2.1 & 3.0

These codes can be used to describe the aspect ratios used when graphics or video sources are composed or generated. They describe the image, the raster and conversion protection ratios. They are designed to be compact yet easy to decode (readable), and are for use in materials requests, recording reports and labelling including VTR Clocks. They can also be used verbally to overcome some of the terminology confusions that exist at present.

## Code Specification:

Code format is thus: **AABCCD** Where **AA** is the first parameter, **B** is the second etc.

The four parameters of the code must be used in the order specified. Not all parameters have to be used if not appropriate or known, however **B** ( The Display Format ) should be present to prevent ambiguity.

### **AA Active Image Aspect Ratio - Number(s)**

Aspect Ratio of Active Image Area expressed as a two digit abbreviated numeric value where the comparison ratio is against a height of 9. Active Image area is the part of the raster / bitmap that contains picture information. 12 is normally used for 4 by 3 ( 12 by 9 ). Note that areas involved with code entry into database systems ask that only two digit codes are to be used. Code 99 is used where ratio is very non-standard and is separately documented.

*ie. Two digit number giving the aspect ratio of the picture area that viewers are interested in, that is neglecting any areas of continuous and static black due to letter-boxing or pillar-boxing. Numbers describing ratios seen in use at present are: 12, 14, 15 ( Super 16 ), 16, 17 (1.85:1), 21 (2.35:1), 24. Thus 14 : 9 becomes **14**.*

### **B Display Format - Letter**

The visual effect of the image and display raster aspect ratios combined. Abbreviated as an initial.

**P** for pillar-box. That is full height but with black down the sides.

**L** for letter-box. That is full width with black top and bottom.

**F** for full frame. Display and Image aspect ratios are the same.

**M** for mixed, that is variations within the material of **P**, **L** or **F**

*ie. if it's purely in letter box presentation put in an **L** etc. e.g. 14**L**12A - "14 by 9 letterbox for..". This letter confirms what the pictures look like and separates the two ratio numbers.*

*Note: Letter **A** has been proposed for material converted an Anamorphic presentation - that is the image is designed to be displayed distorted. This can be as a result of stretching a picture to fit a given display shape whilst avoiding cropping.*

**CC Raster aspect ratio - Number(s)**

Aspect Ratio of the full raster when correctly displayed expressed as a two digit abbreviated numeric value where the comparison ratio is against a height of 9. 12 is used for 4 by 3 ( 12 by 9 ) Note that areas involved with code entry into database systems ask that only two digit codes are to be used. Code 99 is used where ratio is very non-standard and is separately documented.

*ie. Two digit number(s) giving the aspect ratio of entire picture / raster / graphics bitmap, including all the black of any Letterbox or Pillarbox area, that gives a correctly displayed image - . Numbers describing ratios seen in use at present are: 12, 14, 15 ( Super16 ), 16, 17 ( 1.85:1 ), 21 ( 2.35:1 Cinemascope ), 24.*

*e.g. A 16 : 9 full height "anamorphic" raster is shown as 16.*

*A request for material suitable for 16 by 9 TX could just be "supply it in F16 format".*

**D Protection for Conversion. - Letter**

This parameter is for material prepared with "Shoot Protection" for subsequent conversion into other image formats that may safely crop the image. The letter code describes which format the material is "Shoot Protected" for. This parameter's primary use is for transmission with live conversion to indicate on play-out which conversion ratios are required or possible. These letter codes can be applied to both Letterbox and Pillarbox format conversions. Such letter codes are already in use by BBC Presentation.

**A** 16 : 9 protection . ( "Use All of 16:9 image". Deep letterbox in 4:3. )

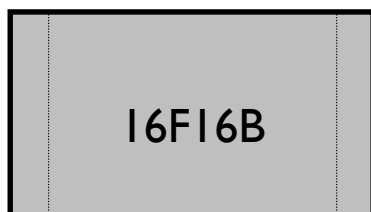
**B** protection for conversion to 14 : 9.

**C** protection for 4 : 3. ( 4 : 3 Centre cut-out format when from 16:9 full frame.)

**D** protection for 15 : 9

**N** or (**blank**). No extra protection other than that for the current display format.

*There may be additional uses for this parameter and further letter codes may be specified.*

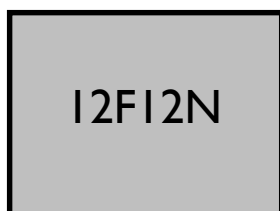
**Examples:**

**16F16B** 16 : 9 image for 16 : 9 display Shoot Protected for conversion to 14 : 9.

*A full frame 16:9 TX tape protected for cropping and conversion to a 14:9 format such as 14: 9 letterbox in 4 :3 raster - 14L12.*

**16F16C** 16 : 9 image for 16 : 9 display Shoot Protected for conversion to 12 : 9.

*A full frame 16:9 TX tape Centre Cut-out protected for cropping and conversion to a 4:3 format such as 12L12 the standard 4:3 PAL format - 12L12.*



**12F12N**

(12:9) 4:3 standard aspect ratio full height pictures. *Standard PAL.*



**14L12N**

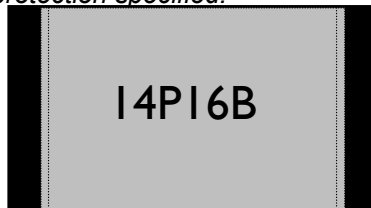
14: 9 letterbox for 12:9 (4:3) display.

*The standard letter-boxed conversion to 4:3 format for Widescreen originated programs.*

**21L16**

21:9 letterbox made for 16:9 display.

*Full 21:9 Cinemascope image as a letterbox in 16: 9 Widescreen TX format. No extra protection specified.*

**14P16B**

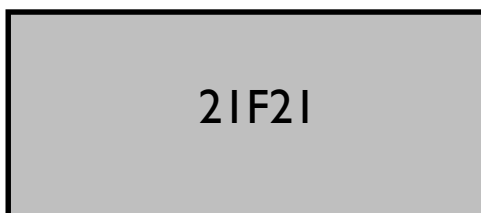
14:9 pillar-boxed image for 16:9 display. 14:9 protected.

*14:9 Pillarbox within a 16:9 display raster. Typically this would be 4:3 archive material converted to Widescreen such that when reconverted on play-out to 14:9 Letterbox (14L12) for 12:9 (4:3) PAL TX, only the black edges are lost.*

**15F15B**

15:9 full raster images shot protecting a 14:9 area.

*These originate from graded telecine transfers of the entire Super 16 film frame where conversion to more than one final format is required.*

**21F21**

21:9 full raster images.

*These are normally graded telecine transfers from the entire Cinemascope film frame where conversion to more than one final format is required. Pictures with "Very tall thin people".*

Changes from ver. 2.1:

4 or 04 removed as an option for 4:3.

Addition of aspect code 99.

Changes from ver. 3.0:

Addition of display format type A

Addition of extra examples and figures.

Addition of protection code D

End of document

**Source of Document:**

*Aspect Ratio Technical Codes for Video and Picture Sources. Proposal 3.1*

*Bill Bulford BBC PP&GD R&D 7/09/98 wcode31.doc*

## Abbreviated Explanation of Aspect Ratio Technical Codes for Video and Picture Sources

(For full details see Section x, Appendix 2)

These codes can be used to describe the aspect ratios used when graphics or video sources are composed or generated. They describe the image and the raster ratios.

### Code Specification:

Code format is thus: **AABCCD**

Where **AA** is the first parameter, **B** is the second etc.

The four parameters of the code must be used in the order specified. Not all parameters have to be used if not appropriate or known, however **B** (The Display Format) should be present to prevent ambiguity.

#### **AA Active Image Aspect Ratio - Number(s)**

Aspect Ratio of Active Image Area expressed as a two digit abbreviated numeric value where the comparison ratio is against a height of 9. Active Image area is the part of the raster / bitmap that contains picture information. 12 is normally used for 4 by 3 (12 by 9).

*ie. Two digit number giving the aspect ratio of the picture area that viewers are interested in, that is neglecting any areas of continuous and static black due to letter-boxing or pillar-boxing. Numbers describing ratios seen in use at present are: 12, 14, 15 (Super 16), 16, 17 (1.85:1), 21 (2.35:1), 24. Thus 14 : 9 becomes **14**.*

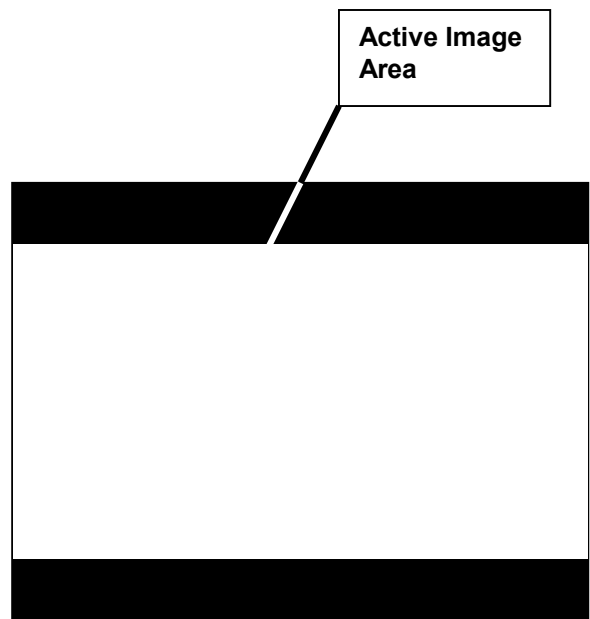
#### **B Display Format - Letter**

The visual effect of the image and display raster aspect ratios combined. Abbreviated as an initial.

<b>P</b> for pillar-box.	That is full height but with black down the sides.
<b>L</b> for letter-box.	That is full width with black top and bottom.
<b>F</b> for full frame.	Display and Image aspect ratios are the same.

*i.e. if it's purely in letter box presentation put in an **L** etc. e.g. 14L12A - "14 by 9 letterbox for..". This letter confirms what the pictures look like and separates the two ratio numbers.*

*Note: Letter **A** has been proposed for material converted an Anamorphic presentation - that is the image is designed to be displayed distorted. This can be as a result of stretching a picture to fit a given display shape whilst avoiding cropping.*



**CC Raster aspect ratio - Number(s)**

Aspect Ratio of the full raster when correctly displayed expressed as a two digit abbreviated numeric value where the comparison ratio is against a height of 9. 12 is used for 4 by 3 (12 by 9)

*i.e. Two digit number(s) giving the aspect ratio of entire picture / raster / graphics bitmap, including all the black of any Letterbox or Pillarbox area, that gives a correctly displayed image.*

*Numbers describing ratios seen in use at present are 12, 14, 15 (Super16), 16, 17 (1.85:1), 21 (2.35:1Cinemascope), 24.*

*e.g. A 16 : 9 full height "anamorphic" raster is shown as 16.*

*A request for material suitable for 16 by 9 TX could just be "supply it in F16 format".*

Examples of common aspect ratios expressed as two digit numbers using this notation.

Aspect Ratio	Two Digit Number
4:3	12
14:9	14
15:9	15
16:9	16
1.85:1	17

Generally:

If the aspect ratio is expressed as: -

$$A : B \quad (\text{width to height})$$

Then the two digit number N representing the comparison ratio against a height of 9 will be given by

$$N = \frac{9}{B} \times A$$

or by transposing

$$B = \frac{9}{N} \times A$$

and

$$A = \frac{B}{9} \times N$$

