Premier
HD6200
Universal High Definition Conversion Platform

Installation & Operator's Manual

Snell & Wilcox Ltd, Durford Mill, Petersfield, Hampshire, GU31 5AZ, United Kingdom.
Tel: +44(0) 1730 818700. Fax: +44(0) 1730 821199

Explanation of Safety Symbols

This symbol refers the user to important information contained in the accompanying literature. Refer to manual.

This symbol indicates that hazardous voltages are present inside. No user serviceable parts inside. This unit should only be serviced by trained personnel.

Safety Warnings

Servicing instructions, where given are for use by qualified service personnel only. To reduce risk of electric shock do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified personnel.

WARNING TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

- **Always ensure that the unit is properly earthed and power connections correctly made.**
- **This equipment must be supplied from a power system providing a PROTECTIVE EARTH connection and having a neutral connection which can be reliably identified.**
- **The power outlet supplying power to the unit should be close to the unit and easily accessible**

Lithium Batteries

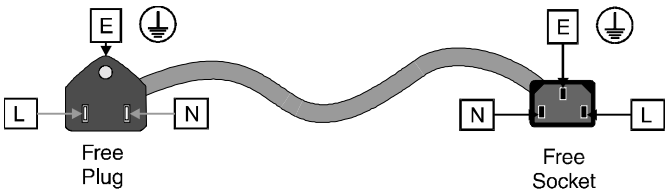
CAUTION
This equipment contains a lithium battery
There is a danger of explosion if this is replaced incorrectly
Replace only with the same, or equivalent type.
Dispose of used batteries according to the manufacturers instructions.
Batteries **shall only** be replaced by trained service technicians

The HD6200 contains two Lithium batteries to provide non-volatile memory. Used batteries should only be disposed according to the manufacturers instructions. The batteries are located at the front left-hand edge of the upper circuit board (HIO), just behind the left card edge ejector.

Power cable supplied for the USA

The equipment is shipped with a power cord with a standard IEC molded free socket on one end and a standard 3-pin plug on the other. If you are required to remove the molded mains supply plug, dispose of the plug immediately in a safe manner. The color 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)

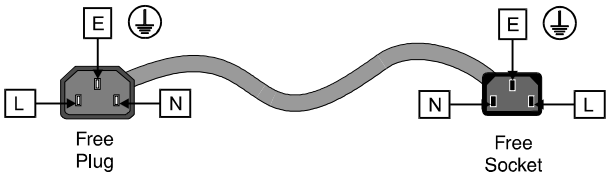


Caution: To reduce risk of electric shock, plug each power supply cord into separate branch circuits employing separate service grounds.

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)



Safety Standard

Safety standards are pending:

EMC Standards

This unit conforms to the following standards:

BS EN 55103-1 : 1997
Electromagnetic Compatibility, Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 1. Emission

BS EN 55103-2 : 1997
Electromagnetic Compatibility, Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 2. Immunity

Federal Communications Commission Rules Part 15, Class A :1998

EMC Environment

The product(s) described in this manual conform to the EMC requirements for, and are intended for use in,
either
The commercial and light industrial environment (including, for example, theatres) E2
or
The controlled EMC environment (for example purpose-built broadcasting or recording studios), and the rural outdoor environment (far away from railways, transmitters, overhead power lines, etc.) E4

The applicable environment is stated in the Technical Profile section of the product operation manual under *"EMC Performance Information/Environment."*

EMC Performance Information

Please refer to the *Technical Profile/Specifications* section of the product operation manual.

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 1694 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 contains information for the installation and operation of the HD6200 unit.

Update/revision sheets should replace existing pages when supplied by the agent or Snell & Wilcox Ltd.

Note that the date at the bottom of the page is the release date of the current revision.

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:

- HD6200 High Definition Crossconverter
- HD6200 Installation & Operator's Manual
- Power cable
- Spare Fuse 3.15 A (T)
- Generic Power Supply Module Installation Manual

Software Version Amendments

Notes about Versions Fitted

Software. This HD6200 is shipped with Software version A3_0_000.

Manufacturers Notice

Important Notice

No responsibility is taken by the manufacturer or supplier for any non-compliance to EMC standards due to incorrect installation.

Table of Contents

SECTION

Manual Revision Record

Date	Version No.	Issue No.	Change	Comments
271100	1	1		First Issue
161001	1	2	Options 7 enhancements Software version to A1_0_004	Complete new manual issued
270702	2	1	Software version to A3_0_003	Complete new manual issued
290802	2	2	RollTrack Audio Delay Tracking section 7 added.	Complete new manual issued

Description

The HD6200 is a compact unit that can convert any High Definition (HD) or Standard Definition (SD) input to any HD or SD output.

The capabilities of the unit are determined by the options fitted. The available options are Cross Conversion (HD to HD), Up-Conversion (SD to HD) and Down-conversion (HD to SD).

Any combination of these options may be fitted.

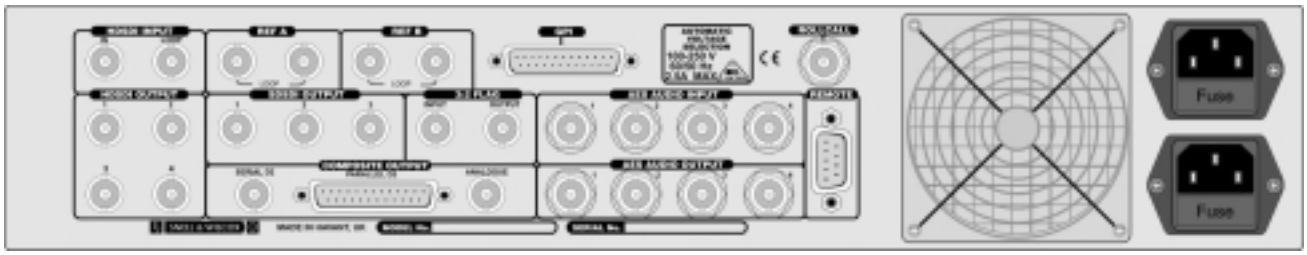
In addition, audio processing capability is available as an additional option.

The HD6200 uses 10-bit processing and has built-in test pattern generator, aspect ratio conversion, and colour space conversion and can genlock to both SD and HD references.

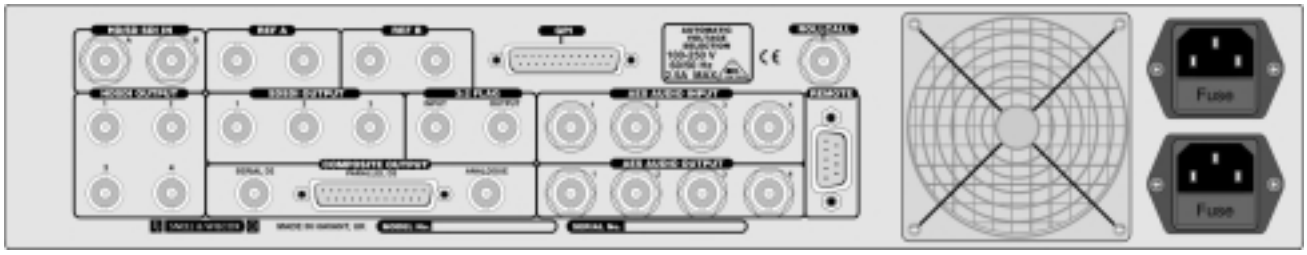
The HD6200 optionally is fitted with two power supplies that can be supplied from different power sources to maximise reliability. It is housed in a 2RU case.

FRONT VIEW

REAR VIEW



Single Input Version



Two Input Version

Features

- All current SMPTE 292M and ITU 709 HD standards supported
- Digital color space conversion
- Aspect ratio control
- Either 1 x HD/SD-Serial Digital in (loop-through) or 2 x HD/SD-Serial Digital in
- 4 x HD-Serial Digital out / 3 x Rec. 601 out (option)
- Powerful 3:2 detection and repair
- Image enhancer/de-enhancer
- 4 user display memories
- 2 genlock inputs with loop-through
- 8 global control memories
- Audio processing
- Time-code processing

Technical Profile

Features

Signal Inputs

Serial Digital	2 x BNC 10-bit HD or SD SDI digital inputs HDTV 1.48GHz - SMPTE 292-1997 and embedded audio SMPTE 299M and or 270MHz Rec 656 and embedded audio SMPTE 272M.
Analog Reference	2 x BNC HDTV Tri-syncs or SD Bi-sync for Genlock – SMPTE 240M/274M
Film Sequence Flag	1 x BNC
RS422	1 x Control port 9-pin D type
Network	1 x RollCall/RollNet remote via BNC
AES/EBU embedder/de-embedder option	4 x BNC 20-bit 48kHz AES/EBU inputs (4 groups) – SMPTE 272M

Signal Outputs

Serial	4 x HDTV serial digital outputs at 1.48GHz – SMPTE 292-1996 and embedded audio SMPTE 299M 3 x SD serial digital outputs at 270MHz – Rec. 601 and embedded audio SMPTE 272M (Option)
Serial	1 x BNC Input Loop-through on units with only one digital input fitted.
Film Sequence Flag	1 x BNC
Analog Reference	2 x loop-through
AES/EBU embedder/de-embedder option	4 x BNC 20-bit 48kHz AES/EBU outputs (4 groups) *Note - embedded audio is not available for 625/24sF and 625/23sF input or output video standards. The AES/EBU inputs and outputs are always available.*

(Encoder Option)

Serial Digital Composite	1 x (D2 to SMPTE 259M-C) PAL, NTSC
Parallel Digital Composite	1 x 25 way D connector
Analog Composite Video	1 x encoded outputs to CCIR report 624-3 PAL, NTSC, PAL M

Input Standard	HD to SMPTE 292M, 299M HD-SDI 750(720)/60p, 1125(1080)/30I 750(720)/59p, 1125(1080)/30p 750(720)/50p, 1125(1080)/30sF 750(720)/30p, 1125(1080)/29i 750(720)/29p, 1125(1080)/29p 750(720)/25p, 1125(1080)/29sF 750(720)/24p, 1125(1080)/25i 750(720)/23p, 1125(1080)/25p 750(576)/50p, 1125(1080)/25sF 750(480)/60p, 1125(1080)/24p 750(480)/59p, 1125(1080)/24sF 1125(1080)/23p 1125(1080)/23sF 1125(1035)/30i 1125(1035)/29i SD-SDI (Upconverter Option) 525(480)/29I, 625(576)/25I 625(576)/24sF, 625(576)/23sF
Output Standard	HD – SMPTE 292M, 299M HD-SDI 750(720)/60p, 1125(1080)/30I 750(720)/59p, 1125(1080)/30p 750(720)/50p, 1125(1080)/30sF 750(720)/30p, 1125(1080)/29i 750(720)/29p, 1125(1080)/29p 750(720)/25p, 1125(1080)/29sF 750(720)/24p, 1125(1080)/25i 750(720)/23p, 1125(1080)/25p 750(576)/50p, 1125(1080)/25sF 750(480)/60p, 1125(1080)/24p 750(480)/59p, 1125(1080)/24sF 1125(1080)/23p 1125(1080)/23sF 1125(1035)/30i 1125(1035)/29i SD-SDI (Down-Converter Option) 525(480)/29I, 625(576)/25I 625(576)/24sF, 625(576)/23sF
Input & Output Blanking	Left & Right in steps of 1 pixel. Top & Bottom in steps of 1 line.
Input Loss	Input/Black
Video Sync Modes	Auto/Optimize/Interpolate/ Synchronize
Conversion Modes	Auto/Video/Video to sF/Video to 3:2/Film/Film to sF/Film to 3:2/sF to 3:2/sF to 1:1/3:2 to sF/3:2 to 1:1/1:1 to 3:2/1:1 to sF
Audio Embedding (Option)	Strip ANC data, select tone/silence, audio pass
Color-space conversion	Auto, SMPTE 274, 260, 240, BT709, No correction
Enhance	Vertical, Horizontal, DeRing

Control Functions

GPI	6 inputs, 6 outputs
Display	Preset Sizes:-
	Full Height, Full Width, Anamorphic,
	16:9 Letterbox, 14:9 Letterbox, Center 4:3
	Variable Pan, Tilt. Size, Aspect and slew-rate.
Display memories	4 user memories
Reference	Auto / Ref.A / Ref.B / Input
	Input Horizontal & Vertical timing
Memory	8 machine memories
Utilities	Pattern On/Off, Pattern select
	Freeze On/Off
	Mono On/Off. Mono type
	Timecode output/synchronizing
	Y/C delay

Specifications

(Encoder Option)

Reference Input Standard	525/625 (same standard as 656 input)
Composite or Black Burst Reference Level	Standard level ±3 dB
Composite Encoding	12 bit (D2 – 10 bit)
Y Frequency Response	5.75 MHz ± 0.25 dB
U/I & V/Q Frequency Response	<-3 dB @ 1.3 MHz (Full) Q=-3 dB @ 600 kHz (narrow)
Differential Gain	Better than 0.5%
Differential Phase	Better than 0.5°
Luminance to chrominance delay	Less than 10ns.
Luminance K Factor 2T pulse	<0.5%.
NTSC setup	54mV (7.5 IRE) selectable on/off
Sch Phase	0º As per D2 specification
Genlock SC Phase offset	360° in steps of 0.1°
Q Signal Bandwidth	Wide/Narrow
Subcarrier pull-in range	±25 Hz
Subcarrier locking time	<1 s
Signal to Noise Ratio	>55 dB

Power

Mains Supply	115 V to 230 V AC 45/60 Hz
Power Consumption	Max. 240 W

Mechanical

Temperature Range	0° to 40° C operating
Cooling	Axial fan
Case Type	2RU Rack Mounting
Dimensions	483 mm x 530 mm x 95 mm (w,d,h)
Weight	14 kg

Installation

UNPACKING THE HD6200

The unit is packed in a single carton. The contents of the carton are as follows:

1 HD6200 unit
1 Power cable
2 Spare a.c. power fuses 3.15 A (T)
1 HD6200 Installation and Operating Manual
1 Generic Power Supply Installation Manual

Unpack the carton carefully and check for any shortages or shipping damage. Immediately report any shortages or damage to Snell and Wilcox Limited. (see front page section 0)

POWER CONNECTIONS

Power Supply

Mains power is supplied to the unit via two filtered IEC connectors. The upper connector is for the PSU installed in the upper position and the lower connector is for the PSU in the lower position. If only one PSU module is installed, only one power connection needs to be made. If two PSU's are fitted then both IEC connectors can be connected to the same power source or different power sources.

The mains power rating is 2.5A maximum from 100V to 250V

One, or optionally two, Snell & Wilcox generic power supply modules type SHDPSUA15 are fitted. The HD6200 does not have a monitoring system; the operation of the LED indicators on the front panel of the module are described in the manual for the power supply.

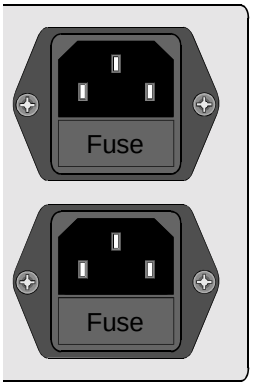
The power supply ON/OFF switches are located on the front of the power supplies inside the front panel.

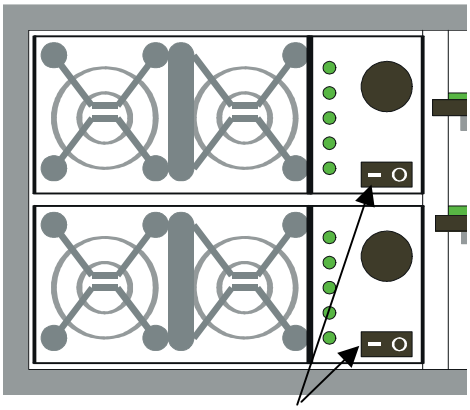
CAUTION: THE FAN EXIT VENTILATION HOLES AT THE SIDE AND REAR OF THE UNIT MUST NOT BE OBSCURED.

Supply Voltage

The power supplies are auto switching for input voltages in the ranges of 100 V to 250 V nominal. No voltage adjustment procedure is required.

CAUTION: THIS UNIT MUST NOT BE OPERATED WITHOUT AN EARTH CONNECTION.





Mains Power On/Off Switches

Environment

Although ruggedly constructed to meet the normal environmental requirements, it is important that there is a free flow of air at the front, left-hand side (looking from the front) and rear to dissipate the heat produced during operation. Installations should be designed to allow for this.

Remote Control

The unit may be controlled via the RollCall remote control system from an active front panel or a PC running the RollCall Control Panel software.

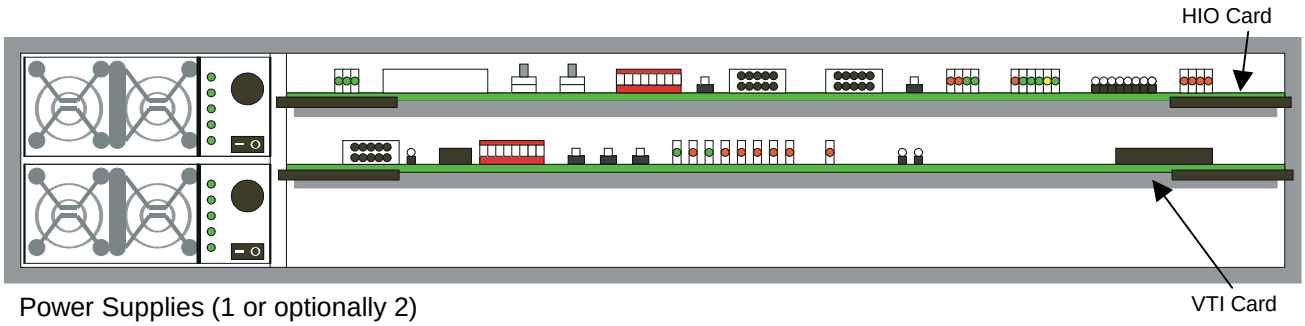
OPENING THE FRONT PANEL

Open the front panel by Turning the black knob at the right-hand end a half-turn anti-clockwise and then hinging the panel open to the left.

The rack mount fixing “ears” are revealed when the panel is open.

Refit the front panel by hinging it back into position and turning the black retaining knob.

Internal View Showing Power Supply and Card Position



INPUT CONNECTIONS

All the connectors are mounted on the rear panel of the unit and are appropriately annotated.

D1 Serial Digital Input (Single Input version)

This is the loop-through HD serial digital input (IN and LOOP).

Single Input Versions

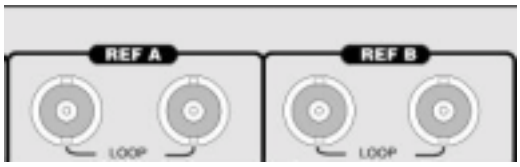
D1 Serial Digital Input (Two Input version)

These are the two inputs (A and B) for HD or SD SDI input signals.

Two Input Versions

Genlock Reference

External HD trisync or SD bi-sync analogue reference signals may be connected to either (REF A or REF B) of these two loop-through BNC connectors.



3:2 Flag

Processing can be controlled from an external 3:2 flag, and the HD6200 can supply a 3:2 flag for external use, using these BNC connectors.

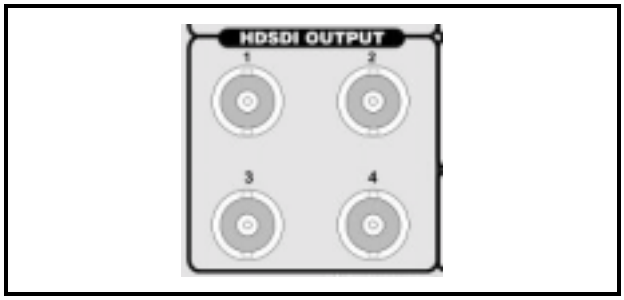
Audio Input Option

Four external stereo channels can be input for embedding in the HD output.

OUTPUT CONNECTIONS

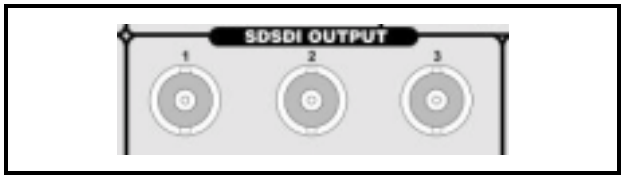
HD SDI Output

Four BNC connectors provide identical HD SDI outputs at 1.5 GHz.



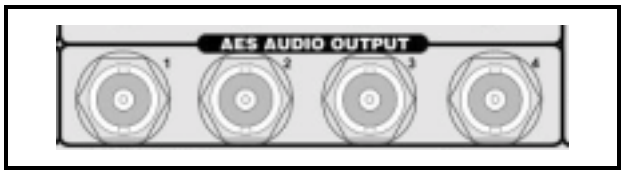
SD SDI Output

Three BNC connectors provide identical SD SDI outputs.



AES Audio Output

The four AES audio outputs are available from these connectors.

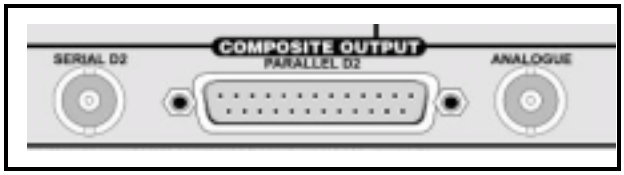


Composite Output (Encoder option fitted)

Analogue Composite Output

There is 1 output of composite video available from the unit via a BNC connector.

Nominal output level is 1V p-p into 75 Ohms and Return Loss is >35dB to 5.5MHz.



Serial D2 Digital Output

There is 1 Serial Digital output of the unit via a BNC connector.

Parallel D2 Digital Output

This is the Parallel Digital output for the unit via a 25-way `D' female connector.

The pin-out is in accordance with SMPTE 259M-C and signal lines (11) are for 100 Ohms.

The signal is encoded in accordance with SMPTE 259M-C, D2 format.

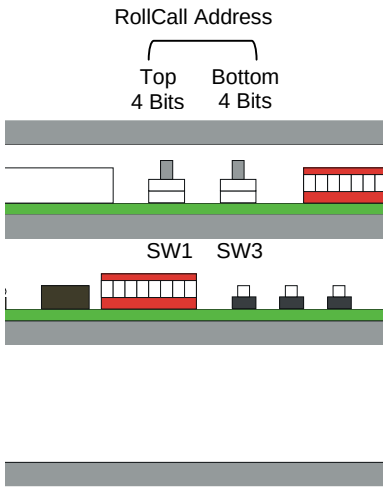
Note that if the Encoder option is not fitted these connectors will have no function.

RollCall

The unit can be controlled via RollCall using the BNC connector or the RS-422 9-way D-type connector."

The RollCall BNC system should be connected using 75 Ohm "T" pieces in a similar manner to an "Ethernet" system. Both extremities of the system must be terminated in 75 Ohms.

A unique address for each unit on the RollCall system must be set by two Hex switches (SW1, SW3) on the printed circuit board. The addresses 00 and FF are reserved and must not be used.



Hex Switches

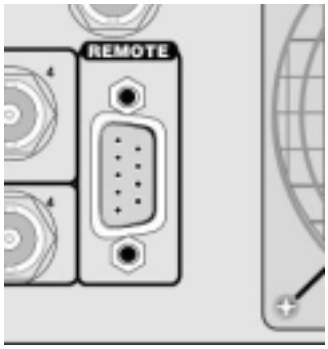
Both of these switches are used to define the Unit Address code for the equipment. They are only read at power-up.

All positions on these switches may be used to set the Unit Address code in Hex (0 to F).

Notes: *In a RollCall™ segment, all units must have different unit address codes. For more information see RollCall™ section.*

The coaxial link is bi-directional and therefore must not be passed through signal switching networks. Also, to allow hum and noise cancellation the screen of the coaxial connection must not be earthed.

RS-422 Port



Pin	Function	Direction
1	Ground	
6	Tx signal common	
2	Transmit A	HD6200 → Remote
7	Transmit B	HD6200 → Remote
3	Receive B	HD6200 ← Remote
8	Receive A	HD6200 ← Remote
4	Rx signal common	
9	Ground	
5	Spare	

GPI

The General Purpose Interfaces (GPI's) are accessed via a 25 way D type female connector. In the table GPI refers to inputs and GPO refers to outputs.

Pin	Function
2	GPI 0 Signal
14	GPI 0 Return
3	GPI 1 Signal
15	GPI 1 Return
4	GPI 2 Signal
16	GPI 2 Return
5	GPI 3 Signal
17	GPI 3 Return
6	GPI 4 Signal
18	GPI 4 Return
7	GPI 5 Signal
19	GPI 5 Return
8	GPO 4 Signal
20	GPO 4 Return
9	GPO 5 Signal
21	GPO 5 Return
10	GPO 0 Signal
22	GPO 0 Return
11	GPO 1 Signal
23	GPO 1 Return
12	GPO 2 Signal
24	GPO 2 Return
13	GPO 3 Signal
25	GPO 3 Return
1	Ground

The output (GPO) characteristics are as follows:

Operating Voltage Range	0 to ±60 V (DC/AC peak)
Maximum Load current	1.0 A (AC/DC)
Maximum On-State Resistance @ Tamb =+25°C	500 mOhm
Minimum Off-State Resistance @Tamb =+25°C,V=±48V	100 MOhm

GPI Overview

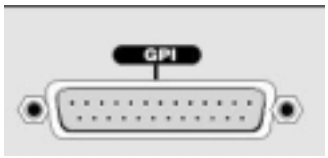
The GPI provides contact closure tally outputs that can be used to turn on lamps etc.

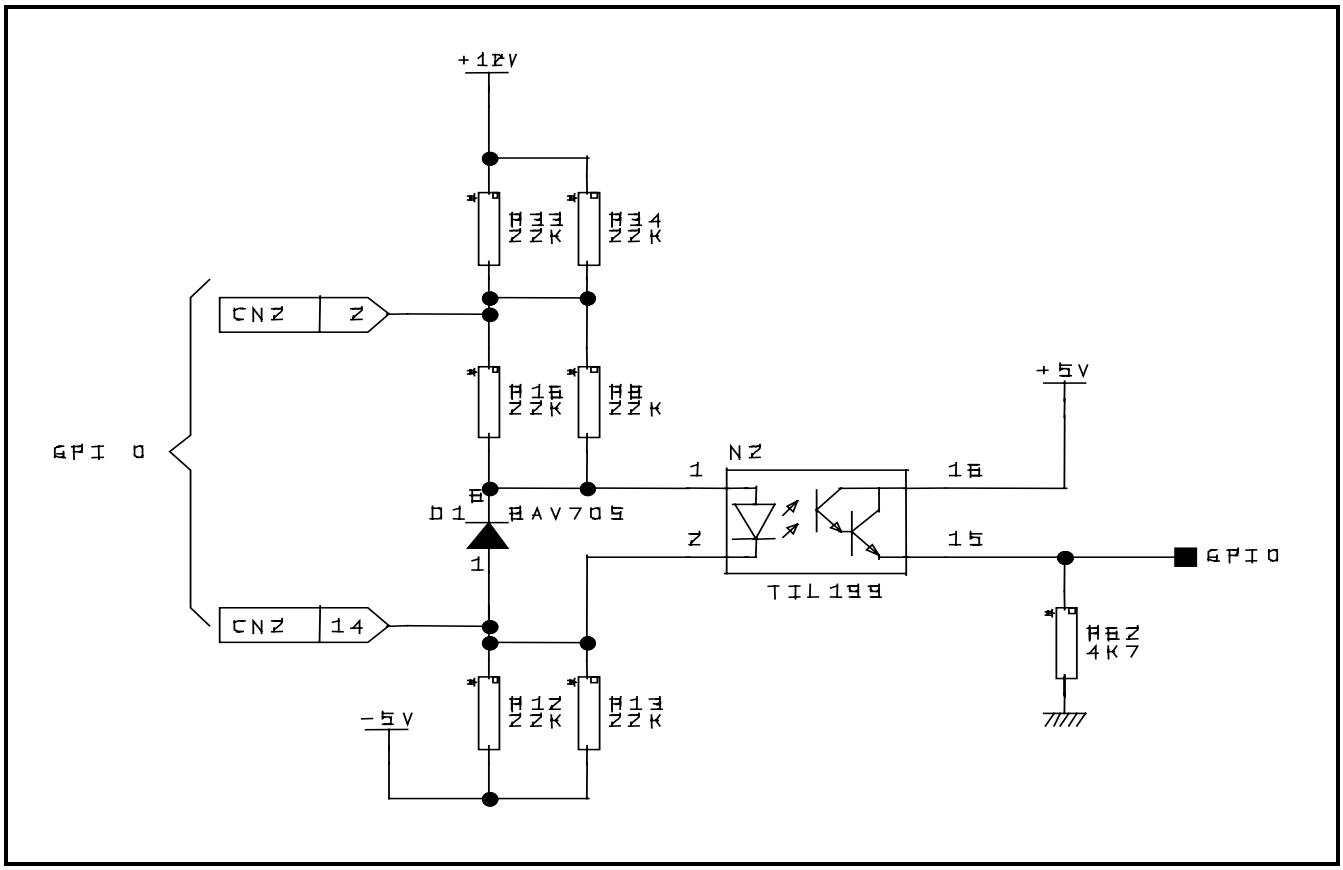
The equivalent circuit of the GPI input is shown on the next page.

Note. On a standard machine when delivered, GPI inputs 0 to 5 select machine memories 1 to 6 and GPI outputs 0 to 5 provide tally outputs indicating which memory is selected.

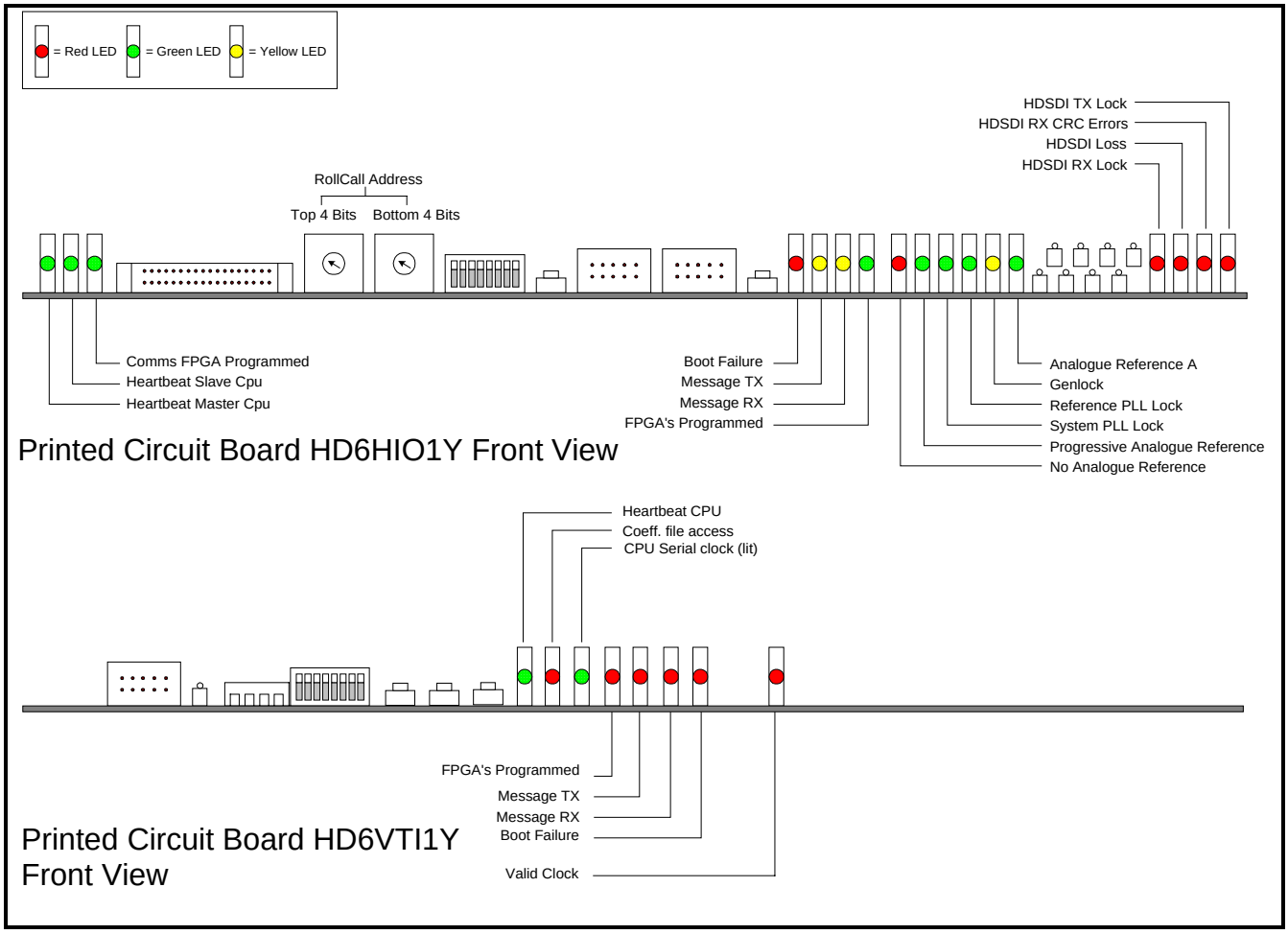
The GPI port is polled approximately 2ms after the vertical sync group of the output video.

Note. For interlaced output standards the polling occurs at field rate and for progressive output standards it occurs at frame rate.





LED INDICATIONS



SWITCHING ON

Open the front panel. Check that power is connected to the HD6200. Set the power switch on the front of the power unit to ON (I). The opening alphanumeric display will appear on the front panel. Close the front panel.

Operation

GENERAL OPERATING PRINCIPLES

The HD6200 may be operated as follows:

1. By using the front panel controls
2. By using a remote control panel or PC via the RollCall control system
3. RS422 control using the RollCall protocols.
4. Using GPI connections to recall memory presets.

All operational parameters and selections may be made by pressing dedicated push buttons and selecting items from a system of menus displayed in the window.

GENERAL OPERATING INFORMATION

Display Window

The control window displays all selection menus sub-menus and unit status information.

Home Display

An example of unit status is shown in Figure 1 indicating that the unit is set to accept a 1125 line interlaced signal (1080 active lines) at 29.97Hz frame rate and the output signal is selected to be 1125 line segmented frame format (1080 active lines) at 23.97 frames per second.

```
In   1125(1080)/29i      | Video > sF
Ref  525(480)/29i (B)    |
Out  1125(1080)/23sF     |
```

Figure 1

The unit is currently locked to a 525 line reference applied to Reference input B.

If the input is not available the words Input Loss! will be displayed and the output will be determined by the set up. *See Figure 2.*

```
In   < Input loss! >     |
Ref  Free-Run            |
Out  1125(1080)/23sF     |
```

Figure 2

If the HD6200 is unable to establish what the format of the input signal is, the word Unknown will be displayed and the output will be determined by the set up. *See Figure 3.*

```
In   Unknown             | Vid > Vid
Ref  Free-Run            |
Out  1125(1080)/29i      |
```

Figure 3

If the HD6200 has had the input video format forced to a particular standard but, the incoming video format does not match the forced setting, the word Mismatch will be displayed and the output will be determined by the set up. *See Figure 4.*

```
In   < Mismatch! >       | Vid > Vid
Ref  1125(1080)/30i (I)  |
Out  1125(1080)/23sF     |
```

Figure 4

The following warning messages may appear to the right of the vertical line:

Pattern, Freeze, Mono, ⚠

The **Home** button always allows a return to the home status screen in the display window from any position in the menu hierarchy.

The **Preset** button will return all settings of the displayed menu to factory or display memory default settings.

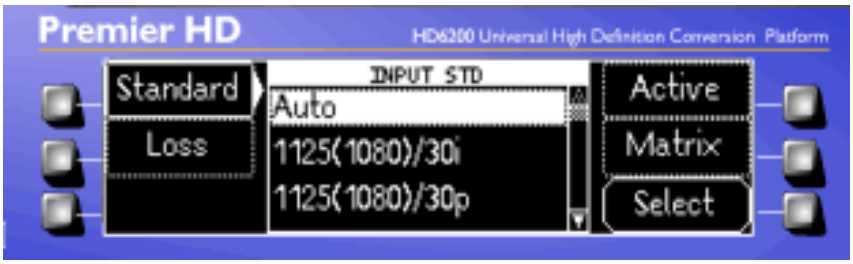
The **Back** button allows a return to the last menu screen that was displayed. Up to 32 menu screens may be retraced using this function.

Using The Control Push Buttons

Various specific operations may be carried out by using these push buttons to access particular functions.

When pressed the relevant menu will appear in the display window and the button LED will become illuminated, indicating that the function is active.

Display Buttons



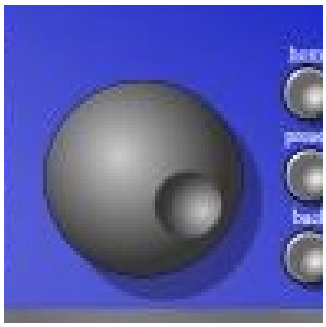
Pressing the button adjacent to the required item makes a selection; the text will become highlighted (reversed text) when active.

Spinwheel

The spinwheel allows selections to be made from the menu. In the example above, rotating the spinwheel clockwise will select the next input standard (the scroll bar shows that there are more standards to select – when the selection is at the limit of the list the appropriate arrow on the scroll bar will become dotted).

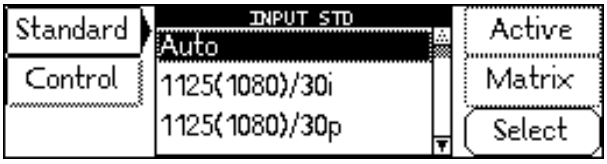
In some cases, in which a change has to be actioned, the item will be enclosed in an oblong box instead of highlighted. The user must then push the “Select” button to action.

Note that the item last selected will be shown highlighted when the menu function is selected.



INPUT

The following menu items are all related to the input signal selection and control.

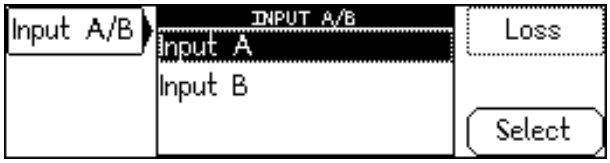


STANDARD
Allows the standard of the input video to be selected. The standards are named using the convention: - total number of lines (active lines)/ frame rate. The options are:

Auto	The machine automatically determines the input video standard.	
750(720)/60p	1125(1080)/30I	Forces the input to the selected standard
750(720)/59p	1125(1080)/30p	
750(720)/50p	1125(1080)/30sF	
750(720)/30p	1125(1080)/29i	
750(720)/29p	1125(1080)/29p	
750(720)/25p	1125(1080)/29sF	
750(720)/24p	1125(1080)/25i	
750(720)/23p	1125(1080)/25p	
750(576)/50p	1125(1080)/25sF	
750(480)/60p	1125(1080)/24p	
750(480)/59p	1125(1080)/24sF	
525(480)/29i	1125(1080)/23p	
625(576)/25i	1125(1080)/23sF	
625(576)/24sF	1125(1035)/30i	
625(576)/23sF	1125(1035)/29i	

Note - not all the listed standards may appear on the list, as they may not be available if the appropriate HD6200 option is not fitted.

When the required standard is highlighted, press the lower right-hand button ❐ adjacent to Select to activate it.

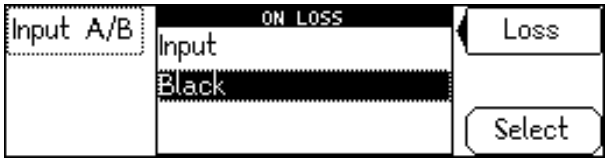


CONTROL
This menu controls the behavior on loss of the video input and, if the HD6200 is fitted with two serial inputs allows input selection.

INPUT A/B

Allows selection of a serial input.
Note - this menu item will not be visible if the HD6200 is not fitted with two serial inputs.

LOSS
Controls the system response to a loss of input signal.



The options on loss of signal are:

Input	The incoming signal will be displayed whenever possible.
Black	The output will cut to black

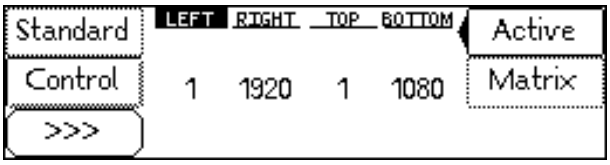
When the required option is highlighted, press the lower right-hand button ❐ adjacent to Select to activate it.

ACTIVE

Allows adjustment of input blanking. It is used where the source video is known to have pixels/lines at the edge of the picture that are not required to be displayed. When set, the machine will blank any output data generated by the input data, regardless of the display control settings.

Note that the HD6200 keeps a separate record of input blanking for each distinct input active picture raster.

To select each of the parameters, press the lower left hand button ❐ adjacent to >>>.

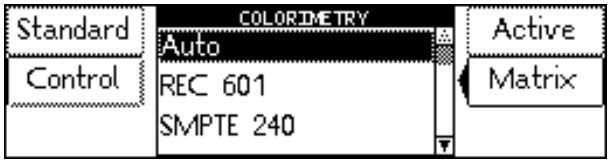


The settings are as follows:

Left	Adjusts the left-hand edge of blanking. A setting of 1 indicates that no input pixels that are normally visible should be blanked, 2 causes the first input pixel to be blanked, etc.
Right	Adjusts the right-hand edge of blanking. A value equal to the number of active pixels per line in the current input standard indicates that no input pixels that are normally visible should be blanked. Subtracting 1 from this causes the last input pixel to be blanked, etc.
Top	Adjusts the top edge of blanking. A setting of 1 indicates that no input lines that are normally visible should be blanked, 2 causes the first input line to be blanked, etc.
Bottom	Adjusts the bottom edge of blanking. A value equal to the number of active pixels per line in the current input standard indicates that no input lines that are normally visible should be blanked. Subtracting 1 from this causes the last input line to be blanked, etc.

MATRIX

Allows the colorimetry on the input signal to be set.



The colour correction options are:

Auto	Automatically selects the colorimetry most appropriate for the output video standard.
REC 601	Colorimetry to REC 601 requirements is applied.
SMPTE 240	Colorimetry to SMPTE 240 requirements is applied.
SMPTE 274	Colorimetry to SMPTE 274 requirements is applied.
BT709	Colorimetry to BT709 requirements is applied.

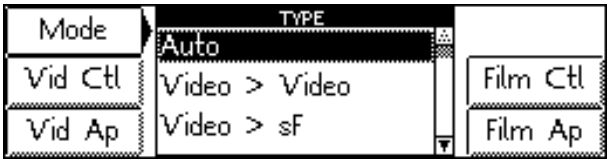
CONVERT

The following menus relate to the conversion from the input signal to the output signal.

MODE

The HD6200 has a number of processing modes and it is important to use the correct mode to achieve the desired conversion.

More details of the available modes are described in the Application note ***The HD6200 film modes*** attached to this manual.



MODE

Auto — In Auto mode the HD6200 checks the input and output standards in order to work out the required processing mode. In general, the HD6200 will assume that the incoming material is Video unless one of the SF input standards are being received.

Video > Video — This makes the HD6200 treat both the input and output as video. i.e with field to field motion. The HD6200 should not be forced into this mode if an SF style output standard is required and the input material is video.

The way this mode operates is controlled by the Video Control menu setting that allows the user to switch between synchronizing and interpolating operation.

Video > SF — This mode makes the HD6200 treat the incoming material as video but, it converts in such a way that the output only has object motion on frame boundaries. This is the mode that should be used whenever the incoming material is video and an SF style output format is required.

Video > 3:2 — This mode makes the HD6200 treat the incoming material as video but, it converts in such a way that the output only has object motion on 3:2 frame boundaries. The 3:2 sequence is produced by an internal 3:2 sequence generator that can be reset based on timecode if desired. (See Menu Convert - Film Ctl - Free Run - Reset Frm below)

Film > Film — This mode makes the HD6200 treat the incoming material as film with a film sequence determined by the Film Sequence Timing Source menu (see below). If the input and output standards have the same frame rate then the HD6200 will endeavor to produce the same film sequence at the output as is present at the input. If the input and output frame rates are different then the output sequence will not be the same as the input but, the HD6200 will never interpolate across input frame boundaries.

SF > 3:2 — This mode is used to convert SF material to 3:2. It is useful for converting 23.97/24Hz SF inputs to 29.97/30/59.94/60Hz outputs with 3:2 sequence. In this mode special care is taken to ensure the integrity of the outgoing 3:2 sequence with respect to the incoming SF. The output is guaranteed to have 3:2 sequence but this may require the repeating or dropping of input frames if the input and output are not locked together or the input SF is not correct.
If this mode is used with 720P/60 or 720P/59.94 as the output standard, then the 720P output will have a 3:2 motion profile. That is, objects will move every two frames, then every three frames etc. The net rate of new frames will be 24Hz.

3:2 > SF

This mode is used to convert 3:2 film material to SF. It is useful for converting 29.97/59.94Hz with 3:2 sequence to 23.96/24Hz SF. In this mode special care is taken to ensure the integrity of the outgoing SF sequence with respect to the incoming 3:2.

The output is guaranteed to have perfect SF sequence but this may require the repeating or dropping of input frames if the input and output are not locked together or the input sequence is broken.

SF > 1:1

This mode is used to convert incoming SF material to a progressive type output. This mode is targeted at producing the low frame rate progressive output standards. For example, it could be used to convert 24Hz SF to 1080P/24 etc. The HD6200 takes special care to try and use all incoming frames when generating the output.

3:2 > 1:1

This mode is used to convert incoming 3:2 material to a progressive type output. This mode is targeted at producing the low frame rate progressive output standards. For example, it could be used to convert 1080I/29.97 with 3:2 motion to 1080P/23.96 etc. The HD6200 takes special care to try and use all incoming frames when generating the output.

Film > SF

This mode is designed to take in film material with non-perfect SF sequence and convert it to perfect SF sequence. The output is guaranteed to be perfect SF. Its primary use will be to process material that has good SF sequence that has been disrupted at edit points. It is NOT designed to take in material that has been played off speed (Varispeed) and correct the sequence.

This mode can also be used to generate SF style output standards that are guaranteed to have complete SF frames. If the incoming material has perfect sequence and an SF output standard is desired, this mode will give good results.

Film > 3:2

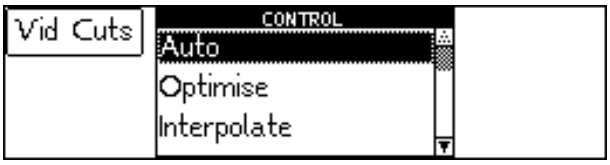
This mode is designed to take in film material with non-perfect 3:2 sequence and convert it to perfect 3:2 sequence. The output is guaranteed to be perfect 3:2. Its primary use will be to process material that has good 3:2 sequence that has been disrupted at edit points. It is NOT designed to take in material that has been played off speed (Varispeed) and correct the sequence.

1:1 > 3:2

This mode is designed to take in low frame rate progressive inputs (e.g. 1080P/23.96) and convert it to have 3:2 sequence (e.g. 1080I/29.97). The output is guaranteed to be perfect 3:2.

VIDEO CONTROL

The following menu items are all related to the temporal conversion of video (not film) based signals. The HD6200 contains a video synchronizer for conversions where the input and output field rates are not locked together. These settings also affect the way that the synchronization is performed.



The options are as follows:

Auto	Selects Synchronise mode when the input and output field rates are the same and optimise mode when they are different.
Optimise	The unit operates as in the Synchronise mode but monitors the amount of slippage between the input and output timing. When the slippage exceeds a preset value the unit performs an interpolation to move to the next available minimum blur temporal position. The effect of this is to give the same high performance as the Synchronise mode but without periodically discarding or repeating a field; for example, in 59.94 to 60Hz mode only about half a second of interpolation occurs in every 16 seconds. However, because of the system used, the video delay through the machine can vary by up to plus or minus half a field.
Interpolate	The output is always interpolated from the input. This will give the smoothest output but at the expense of potential blurring of moving objects.
Synchronise	Gives the highest performance with minimum output blurring. If the input and output field rates are not identical it can cause field drops or repeats which may have the effect of causing moving objects to judder.

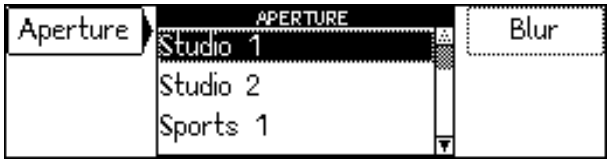
VIDEO CUTS

If VIDEO CUTS are enabled then an internal scene change detector is employed to try and ensure that interpolation is not done across scene changes. Note that this setting only affects the performance if the HD6200 is in a video input mode. i.e. Video > Video, Video > sF or Video > 3:2.

VIDEO APERTURE

APERTURE

The video aperture control varies the temporal filter shape.



The options are:

Studio 1	The most diffuse temporal aperture. Useful for stills and slow-moving video with fading cuts.
Studio 2	
Sports1	
Sports 2	The sharpest temporal aperture. Appropriate for fast-moving material with fast pans and field-based cuts, etc.

BLUR

The blur control adjusts the amount of temporal low pass filtering applied to the video input. This can be used to adjust the output picture temporal sharpness to achieve the desired look. This control can also be useful for conversions such as Video>sF and Video>3:2. For some combinations of input and output standards (e.g 525/59.94 in and 1080/23sF out) the conversion can produce undesirable low frequency beat frequencies on the output. These can be reduced by increasing the Blur setting to Medium or High.

Auto	The HD6200 uses the input and output standards to determine the optimum blur setting. This will give the best result for most conversions.
Off	The minimum possible amount of blur is produced.
Low, medium & High	These have gradually increasing amounts of blur.

FILM CONTROL
When selected the menu shown below is displayed.

FLAG SOURCE

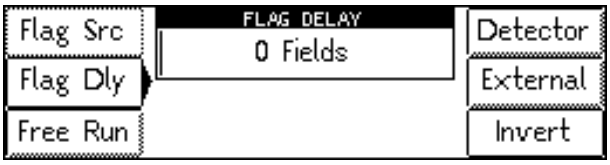
The selects the source of the film sequence information for the input video stream.

The options are:

Auto	If the input video is an sF video format the HD6200 switches to Internal Mode (see below) otherwise it uses the internal film sequence detector.
Free Run	The HD6200 generates an internal free running continuous 2:2 or 3:2 film sequence. The type of free run sequence (2:2 or 3:2) is determined by the CONVERT - FILM CTL - FREE RUN -TYPE menu setting. The phase of the free run sequence with respect to the input video is set by the CONVERT - FILM CTL - FLAG DELAY menu setting.
Detect	The HD6200 uses an internal film sequence detection algorithm to establish the incoming film sequence. This can be used with "broken" film sequence as well as "perfect" 2:2 or 3:2 film sequences.
Internal	This uses the frame signal of the input video to establish the pairing of 2:2 film sequences. i.e input field ones are the first field of the film frames and input field twos are the second field of the film frames. If the input dominance is reversed the internal sequence may be inverted using the FILM CTL - INVERT button.
External	This uses an external TTL pulse from the BNC connector on the rear panel. The meaning, sense and delay of the input pulse are set using the FILM CTL - EXTERNAL sub-menu settings.
Timecode (Trig)	This uses the internal free running 2:2 or 3:2 sequence generator as described in FREE RUN mode above. However, the phase of the free running sequence generator is reset by the timecode on the incoming video. The input timecode value that causes the free run generator to be reset is set on the UTILS - TIMECODE - TRIGGER menu. The phase of the free run generator at the reset point is set using the CONVERT - FILM CTL - FLAG DELAY menu setting.
Timecode (0 & 5)	This uses the internal free running sequence generator. The free run generator is reset whenever the input video timecode has a frame count of zero or 5. This is useful when the incoming 3:2 sequence has a timecode locked sequence. Note that this method can only work if the incoming timecode is non-drop and, the phase of the free run generator at the 0 and 5 frame counts is set by the CONVERT - FILM CTL - FLAG DELAY menu setting.

FLAG DELAY

This is used to align the free running film sequence pulse with the incoming video. The adjustment represents the number of fields of delay applied to the free running pulse train.

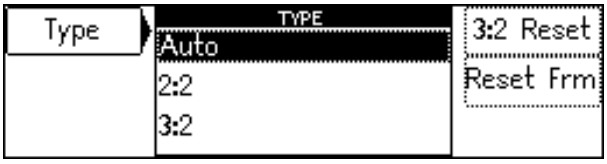


This is used to align the free running film sequence pulse with the incoming video. The adjustment represents the number of fields of delay applied to the free running pulse train.

If the free running pulse is of 3:2 type then the correct delay will be a value between 0 and 4 fields inclusive. If the pulse is of 2:2 type then there are only two possible phases. Thus setting the delay to 0,2 or 4 produce one phase and setting the delay to 1 or 3 produces the alternate phase.

Note that this setting has an effect when the flag source is set to Free Run, Timecode (Trig) or Timecode (0 & 5).

FREE RUN



These menu items are used to set up the internal free running **input** film sequence generator and, the **output** internal 3:2 sequence generator.

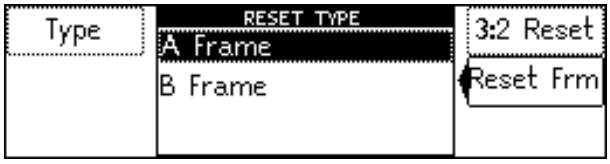
TYPE	This sets up the internal **input** film sequence generator.
AUTO	The HD6200 will use the input video standard to determine the free running sequence type.
2:2	The free run generator is forced to make 2:2 (sF) film sequence.
3:2	The free run generator is forced to make 3:2 film sequence.

3:2 RESET

This sets up the internal output 3:2 film sequence generator. If the HD6200 internal 3:2 sequence generator is in use (in conversion modes Video>3:2,Film>3:2,sF>3:2 and 1:1>3:2) then the phase of the 3:2 generator can be reset using the input and output timecode values (see UTILS-TIMECODE section below).

Off	The internal 3:2 sequence generator cannot be reset by timecode.
On	The internal 3:2 sequence generator can be reset by timecode.

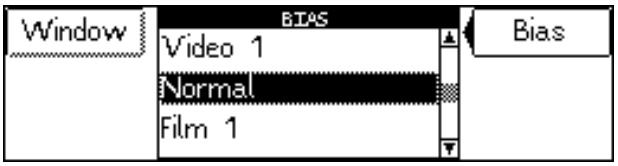
RESET FRM



This sets up the reset phase of the internal **output** 3:2 film sequence generator if the 3:2 RESET menu item above has been set top ON.

A Frame	When the internal output 3:2 generator is reset it makes an A Frame.
B Frame	When the internal output 3:2 generator is reset it makes an B Frame.

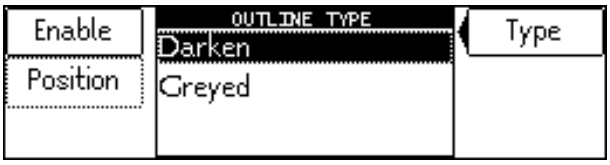
DETECTOR



This menu controls the operation of the internal film sequence detector.

BIAS
This menu adjusts the bias of the internal film sequence detector. This should not normally be necessary, the Normal setting works well on most material. However, on difficult material it can be used to steer the detector towards the correct answer. If the bias is adjusted towards video it is more likely to detect orphan fields. If the bias is adjusted away from video and towards film it is less likely to generate orphan fields and more likely to generate repeat fields.
This can be particularly useful on Varispeed material. If the playback speed is high then the detector can be adjusted towards video to help find any orphan fields. If the playback speed is low then the detector can be adjusted towards film to help find any extra repeat fields. The default setting is Normal. Video 1 adds a small bias towards finding orphan fields. Video 2 adds a larger bias towards orphan fields. Film 1 adds a small bias towards repeat fields. Film 2 adds a larger bias towards repeat fields.

WINDOW

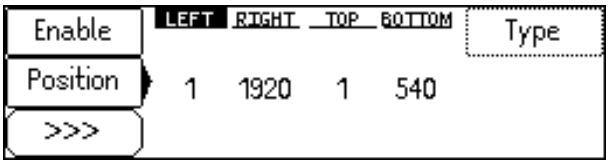


The HD6200 film sequence detection circuit operates over a windowed section of the input picture. By default the whole of the input image lies within the window. However, it may be desirable to exclude certain areas of the picture from the window. To facilitate this, the window can be made visible on the HD6200 output video so that it can easily be adjusted.

Note, the window is applied to the HD6200 input video so it is advisable to have all of the input video visible when making the adjustment. For example, by selecting a full height display (see DISPLAY-PRESETS menu).

ENABLE
Turns the film sequence window on and off. This should be set to off, except when adjusting the sequence window, or the HD6200 output will be incorrect.

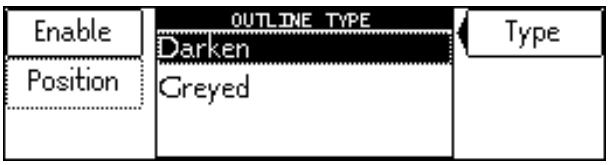
POSITION



To select each of the parameters, press the lower left hand button adjacent to >>>.

Left	Adjusts the left-hand edge of the window in pixel increments.
Right	Adjusts the right-hand edge of the window in pixel increments.
Top	Adjusts the top edge of the window in 1 line increments.
Bottom	Adjusts the bottom edge of the window in 1 line increments.

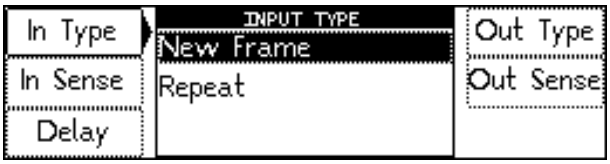
TYPE
This controls the appearance of the sequence window when it is visible.



The options are:

Darken	The gain of video inside the window is reduced.
Greyed	The video inside the window is monochrome.

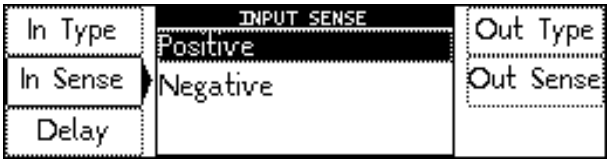
EXTERNAL
These menus the are used to set up the input and output TTL film pulses on the HD6200 rear panel BNCs.



IN TYPE
This menu selects what type of pulse is being applied to the input film sequence pulse BNC.

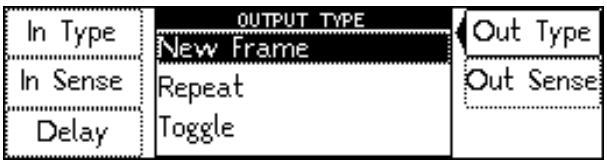
New Frame	If New Frame is selected the HD6200 expects a pulse which indicates that a new film frame has been produced by the Telecine. This is also known as a Start of Frame pulse or a Read Frame Sequence pulse.
Repeat	If Repeat is selected the HD6200 expects a pulse which indicates that a repeat field has been produced by the Telecine.

IN SENSE
This menu selects the electrical form that the input film sequence pulse takes.



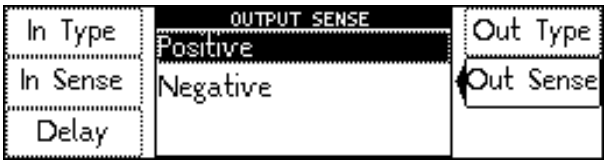
Positive field	Selects a pulse that is active HI during a new or repeat field.
Negative field	selects a pulse which is active LO during a new or repeat

OUT TYPE
This menu selects what type of pulse is being applied to the output film sequence pulse BNC.



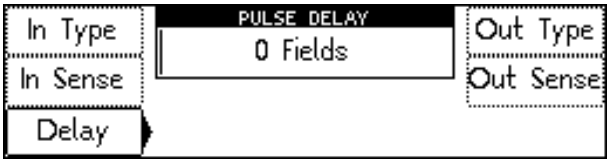
New Frame	If New Frame is selected the HD6200 outputs a pulse which indicates that a new film frame has been produced by the HD6200
Repeat	if Repeat is selected the HD6200 outputs a pulse which indicates that a repeat field has been produced by the HD6200.
Toggle	if Toggle is selected the HD6200 outputs a pulse that toggles every time a new film frame is produced by the HD6200.

OUT SENSE
This menu selects the electrical form that the output film sequence pulse takes.



Positive Field	Selects a pulse that is active HI during a new or repeat field.
Negative Field	Selects a pulse that is active LO during a new or repeat field.

DELAY



This sets the number of input fields of delay that are applied to the incoming film sequence pulse. This allows the user to set the timing of the pulse so that it matches the incoming video sequence. Thus, if there is a video processing delay between the Telecine and the HD6200 then this can be compensated for with this setting. Up to 15 input fields of delay can be applied to the incoming pulse.

INVERT

If the input film sequence source has been set to INTERNAL the INVERT button controls the dominance of the internal (2:2) film sequence generator. For input material with normal dominance INVERT should be OFF. For material with inverted dominance, INVERT should be ON. Normal dominance occurs when a frame is made by field ones and the following field twos. Inverted dominance occurs when a frame is made by field twos and the following field ones

FILM AP

These menus control the filter apertures used when the HD6200 is in a conversion mode that treats the incoming material as film. In these modes the HD6200 will treat the material as individual film frames and will not interpolate across frame boundaries.

The options are:

Sharp — The HD6200 aims to extract the maximum possible vertical resolution from the incoming material. Film material can be converted to provide greater resolution than is possible with video material when the incoming material contains the extra detail.

Normal — This aperture does not extract quite as much vertical resolution as the Sharp aperture. It does however still assume that the incoming material is film based and can therefore give very good results in the presence of vertical detail. Because it does not try to retain all possible detail it is much more tolerant of film sequence detection errors. As such it is suitable for all but the most demanding film applications and would normally be recommended.

Anti_Alias — This aperture incorporates a vertical low pass filter. This provides two main benefits. Firstly, if the HD6200 is outputting standard definition signals then, this filter should ensure that not too much vertical detail is retained in the output. Too much vertical detail can give the appearance of excess twitter and alias. Secondly, this aperture is even more tolerant of film sequence errors than the NORMAL aperture.

Safe — The film frame pairing algorithms are still used. However, the filter does not try to extract as much vertical resolution from the input and the filter is tolerant of video based material.

ADAPTION

If the Film Adaption setting is turned on then the HD6200 will adapt the film conversion aperture to match the incoming material if the sequence detector is turned on. This allows mixed film and video to be put through the HD6200 with film material using a film aperture and video material using a video aperture. Adaption is also undertaken around scene changes to provide protection against undetected orphan fields in the edit point regions, which could otherwise cause picture tearing.

DISPLAY

This menu is used to control the size, shape and position of the output picture.

PRESETS
This allows selection of the preset display sizes.

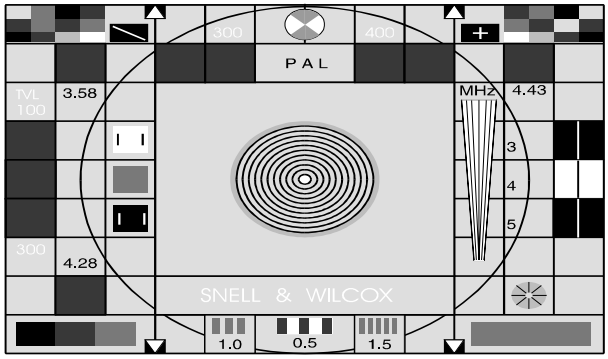
The options are:

Anamorphic This setting retains all picture information from the input and passes it to fill the output image regardless of the aspect ratio conversion. This means that 16:9 to 4:3 conversions will appear squeezed horizontally.

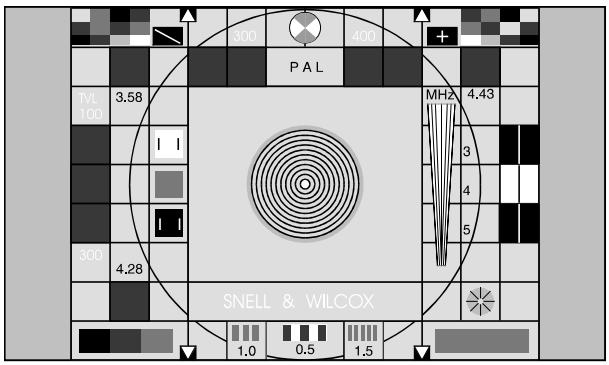
Full Height *For 4:3 to 16:9 aspect ratio conversions only.* Produces a 4:3 output with all input picture information retained and blanked columns to the left and right of the image.

Full Width Produces a 16:9 output. The whole output screen is filled and information at the top and bottom of the input image may be lost. Used when converting a 4:3 image to a 16:9 display when it is necessary to fill the entire output display.

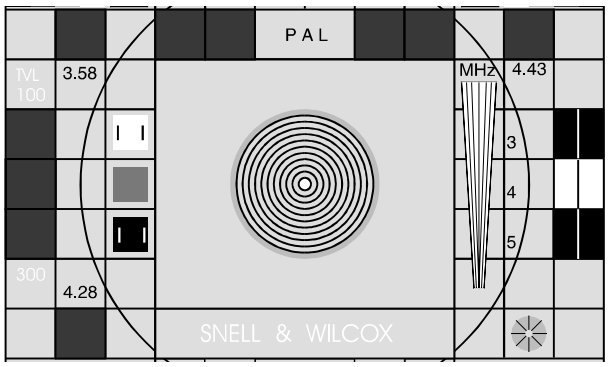
To activate the newly selected display type press the lower right button ❐ adjacent to Select.



Anamorphic



Full Height



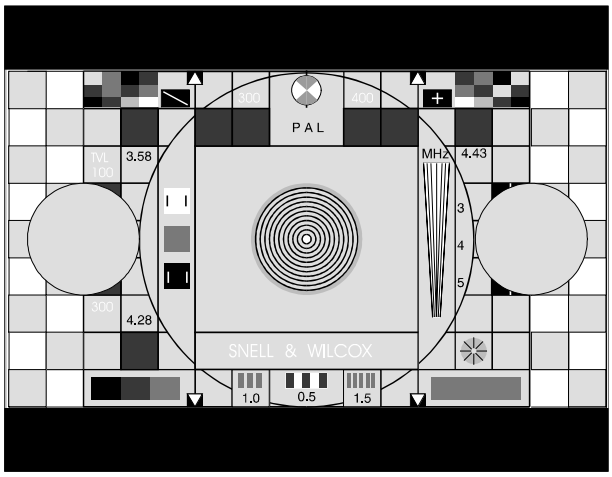
Full Width

Letterbox *For 16:9 to 4:3 aspect ratio conversions only*. To maintain the correct shape of objects on the 16:9 input, this displays the 16:9 picture as a strip across the centre of the 4:3 display.

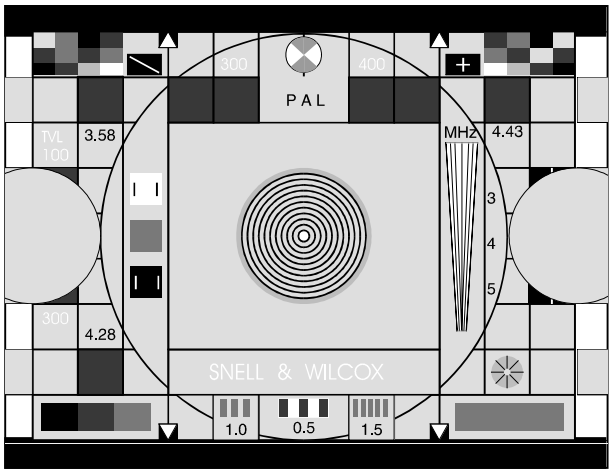
Letterbox (14:9) *For 16:9 to 4:3 aspect ratio conversions only*. To display as large a picture as possible without losing too much of the 16:9 picture, the sides are cropped slightly.

Centre (4:3) For 16:9 to 4:3 aspect ratio conversions only. To maintain the correct shape of objects on the 16:9 input, this setting retains all vertical detail but crops the left and right edges of the image.

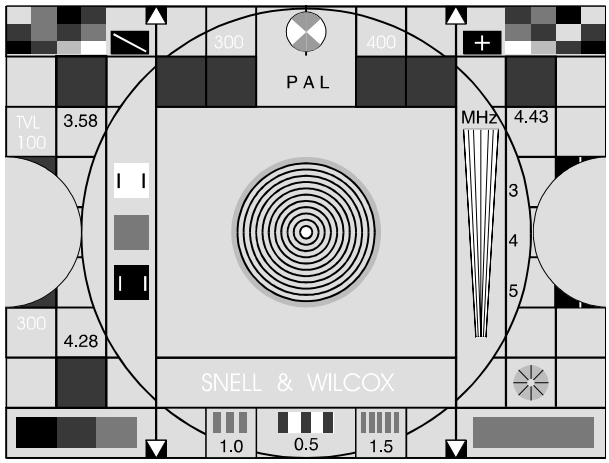
To activate the newly selected display type press the lower right button ❐ adjacent to Select.



Letterbox



Letterbox (14:9)

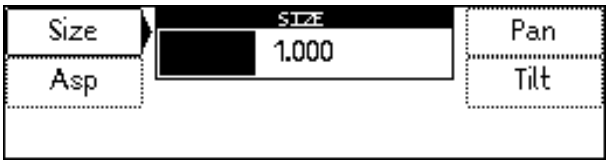


Center (4:3)

VAR
Allows the picture size, shape and position to be adjusted to meet custom requirements.

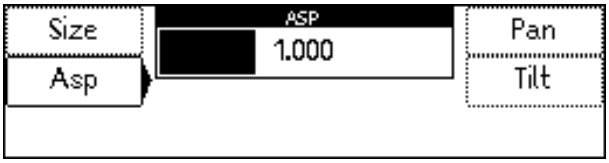
The options are:

Size



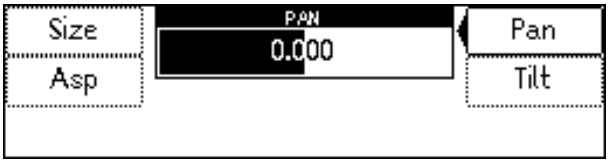
Adjusts the size of the whole image.
Both vertical and horizontal size change together while maintaining the aspect ratio of the image.

Asp



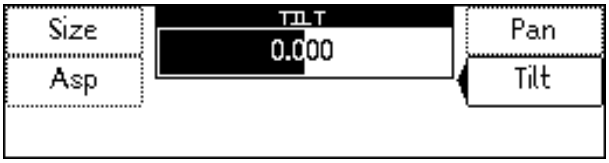
Adjusts the horizontal size of the image, allowing the shape (aspect ratio) of the output image to be changed.

Pan



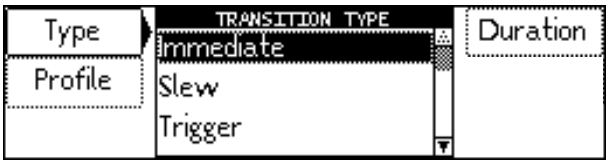
Adjusts the horizontal position of the output image.

Tilt



Adjusts the vertical position of the output image.

SLEW
Controls the method and the timing of a picture size change

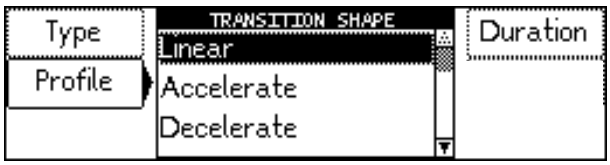


If Slew is not zero and there is no trigger, when a change of aspect ratio is made it will slew from one to another with the specified profile and duration. This will also occur if another memory is selected, which has a different aspect ratio.

TRANSITION TYPE
Selects the type of transition that will be performed. Options are:

Immediate	Transition from one picture size to another is instantaneous.
Slew	Transition from one picture size to the next occurs at a speed set by the DISPLAY-SLEW-DURATION menu and follows a profile set by the DISPLAY-SLEW-PROFILE menu.
Trigger	Transition from one picture size to the next only occurs when a trigger command is sent down one of the remote control channels. Multiple picture parameters can be set in advance and then activated using a single trigger command. Note that if trigger mode is selected then adjusting the picture size, shape or position from the front or remote control panel will have no effect unless a trigger command is received. Trigger mode causes an immediate transition to the next picture size.
Trigger Slew	Trigger Slew works the same as Trigger mode (above) but, instead of an immediate transition to the next picture size the transition is slewed at a speed set by the DISPLAY-SLEW-DURATION menu.

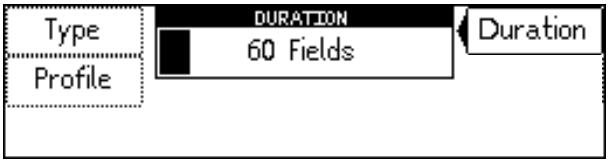
PROFILE
Selects the “shape” of the transition.



The options are:

Linear	The rate of change of the picture parameters is constant throughout the transition.
Accelerate	The rate of change of the picture parameters increases throughout the transition.
Decelerate	The rate of change of the picture parameters decreases throughout the transition.
S-Curve	The rate of change increases and then decreases as the transition progresses.

DURATION



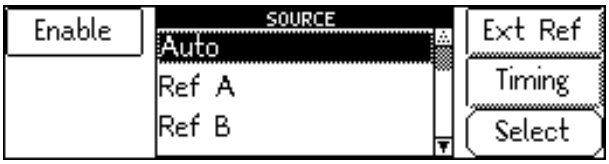
Sets the duration of the transition in fields or frames if the output video standard is interlaced or progressive respectively.

MEMORY

This menu is used to store and recall the various User Display memories. There are four User Display memories available in each of the eight machine memories. Each User Display memory contains the Size, Aspect ratio, Pan and Tilt parameters of the image.

REFERENCE

This menu is used to control the genlocking functions of the HD6200.



ENABLE
Toggles between genlocking on and genlocking off.

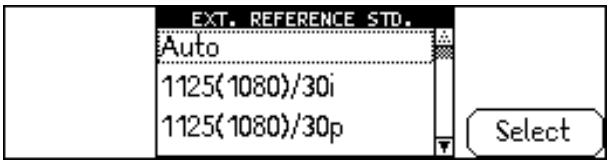
SOURCE
Selects the source of the reference signal. Options are:

Auto	The HD6200 will scan the Reference-A input, the Reference-B input and the Input video until it finds a suitable reference signal. If a new search of the available reference inputs is required, toggling the genlock enable button will cause a new search to begin at Ref A.
Ref A	Forces the HD6200 to operate from the external reference A input.
Ref B	Forces the HD6200 to operate from the external reference B input.
Input	Forces the HD6200 to lock to the video input.

To activate the newly selected source press the lower right button ❐ adjacent to Select.

Note - if the encoder output option has been fitted to the HD6200 and it is required to burst lock the unit, the Black burst reference must be applied to Ref B. See the OUTPUT-CONTROL - D2 O/P menu item for more information.

EXTERNAL REFERENCE
Sets the reference standard. The selected standard will appear on the second line of the Home screen.

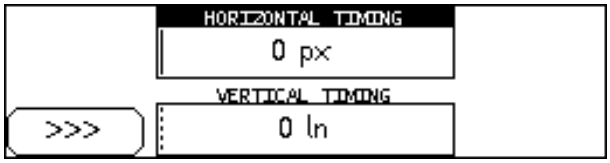


To activate the newly selected reference press the lower right button ❐ adjacent to Select.

The user can force the reference standard to the required value or select Auto. The full range of references is as follows:

Auto	The HD6200 measures the selected reference signal and automatically chooses the reference standard.	
750(720)/60p	1125(1080)/30I	Forces the reference standard selected
750(720)/59p	1125(1080)/30p	
750(720)/50p	1125(1080)/30sF	
750(720)/30p	1125(1080)/29i	
750(720)/29p	1125(1080)/29p	
750(720)/25p	1125(1080)/29sF	
750(720)/24p	1125(1080)/25i	
750(720)/23p	1125(1080)/25p	
750(576)/50p	1125(1080)/25sF	
750(480)/60p	1125(1080)/24p	
750(480)/59p	1125(1080)/24sF	
525(480)/29i	1125(1080)/23p	
625(576)/25i	1125(1080)/23sF	
625(576)/24sF	1125(1035)/30i	
625(576)/23sF	1125(1035)/29i	

TIMING
This menu allows the adjustment of the genlock timing with respect to the selected reference signal.

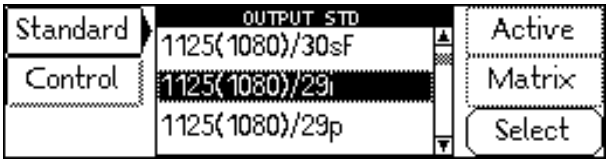


To select each of the parameters, press the lower left hand button ❐ adjacent to >>>. The options are:

Horizontal Timing	Adjusts horizontal genlock timing. Range is zero to one output line in steps of one output pixel.
Vertical Timing	Adjusts vertical genlock timing. Range is zero to one output frame in steps of one output line.

OUTPUT

The following menu items are all related to the output signal standard and control.



STANDARD
This allows selection of the output video standard. The standards are named using the following convention: total number of lines, (active lines), frame rate. For an HD6200 fitted with High Definition output capability the following standards are available: -

750(720)/60p	1125(1080)/30I
750(720)/59p	1125(1080)/30p
750(720)/50p	1125(1080)/30sF
750(720)/30p	1125(1080)/29i
750(720)/29p	1125(1080)/29p
750(720)/25p	1125(1080)/29sF
750(720)/24p	1125(1080)/25i
750(720)/23p	1125(1080)/25p
750(576)/50p	1125(1080)/25sF
750(480)/60p	1125(1080)/24p
750(480)/59p	1125(1080)/24sF
	1125(1080)/23p
	1125(1080)/23sF
	1125(1035)/30i
	1125(1035)/29i

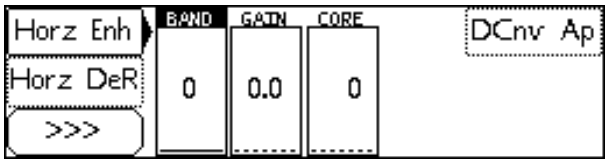
For an HD6200 fitted with Standard Definition output capability the following standards are available: -

525(480)/29i
625(576)/25i
625(576)/24sF
625(576)/23sF

To activate the newly selected standard press the lower right-hand button ❐ adjacent to Select.

CONTROL(Encoder Option not fitted)

When Control is selected, the image below is displayed.



HORIZONTAL APERTURE

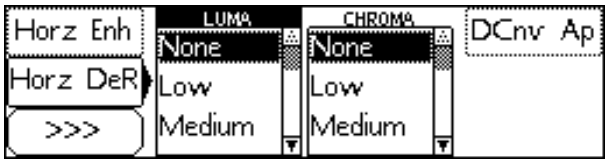
These menus adjust the horizontal filter settings.

HORIZONTAL ENHANCEMENT

Controls the high frequency horizontal information to make the output pictures appear sharper. Options are:

Band	Selects which frequency band within the picture is enhanced, 0 corresponds to lowest frequency band, 3 is the highest.
Gain	The amount of gain applied to the band selected for enhancement before the coring process.
Core	Used to reject signals below the selected threshold before addition to the original signal. This has the effect of preventing the enhancement process from amplifying noise.

HORIZONTAL DE-RING



Controls the de-ringing filters for both luminance and chrominance. Options are:

None	
Low	Minimum de-ring
Medium	↓
High	Maximum de-ring

DCNV AP

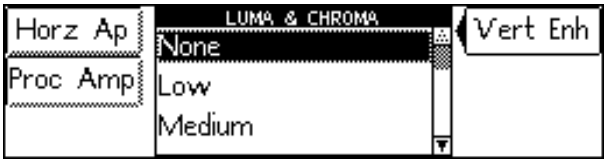
This selects the horizontal filter used when the HD6200 is being used as a down-converter i.e high definition video in, standard definition video out.

Normal This selects an aperture that has been optimized for the normal range of down-conversions. This setting will give the best results under most circumstances.

Zoom This aperture can be used if a very large horizontal zoom has been applied by the HD6200. e.g. if the ASP control (see DISPLAY -VAR-ASP menu setting) has been set to the maximum value. Choosing the Zoom aperture under these circumstances can provide increased horizontal resolution at the output of the HD6200.

VERTICAL ENHANCEMENT

This controls the detail processing in the vertical filters.



The enhancer adjusts the levels of high frequency vertical information for luminance and chrominance together to make the output pictures appear sharper or softer. Options are:

None

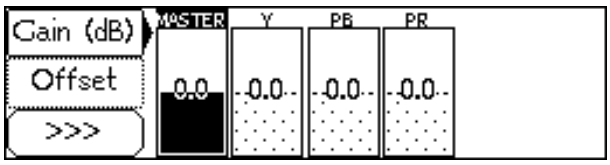
Low Minimum enhancement

Medium

High Maximum enhancement

PROCESSING AMPLIFIERS

Allows adjustment of the gain and offset of the output video.



GAIN

These menu items allow the user to adjust the gain of the luminance (Y), blue colour difference channel (Pb) and the red colour difference channel (Pr). The Master gain is applied to all three channels simultaneously while the Y, Pb and Pr gains are only applied to the selected channel. Thus, the overall gain of any channel is the product of the master gain and the individual gain. The gain controls have a range of ±6dB with a preset value of 0dB. The options are:

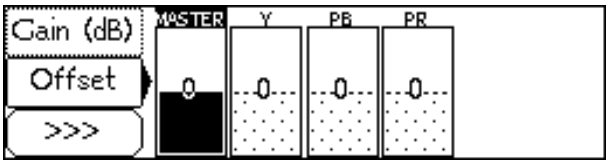
Master All 3 channels adjusted simultaneously

Y
Pb } Individual channel adjustment
Pr

To select each of the parameters, press the lower left hand button ❐ adjacent to >>>.

OFFSET

This allows adjustment of the offset for luminance (Y), blue colour difference (Pb) and red colour difference (Pr). The Master offset is applied to all three channels simultaneously while the Y, Pb and Pr offsets are only applied to the selected channel. The controls are shown in 10-bit digital video levels.



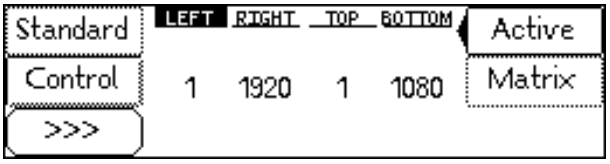
To select each of the parameters, press the lower left hand button adjacent to >>>. The options are:

Master	All 3 channels adjusted simultaneously
Y Pb Pr	Individual channel adjustment

ACTIVE

Allows the user to adjust the output blanking. Output blanking is used when it is required that ranges of output lines or pixels are never active. For example, it is possible to impose an artificial letterbox by bringing the top output blanking down and the bottom output blanking up.

Note that the HD6200 keeps a separate record of output blanking for each distinct output active picture raster.

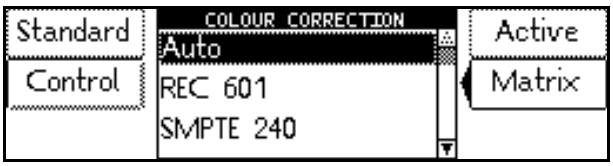


To select each of the parameters, press the lower left hand button ❐ adjacent to >>>. The options are:

Left	Adjusts the left-hand edge of output blanking. A setting of 1 indicates that no output pixels that are normally visible should be blanked, 2 causes the first output pixel to be blanked, etc.
Right	Adjusts the right-hand edge of blanking. For example, 1920 indicates that no output pixels that are normally visible should be blanked in the 1125(1080)/29I output standard. 1919 causes the last output pixel to be blanked, etc. Note that the preset value will vary with the output standard as it is equal to the number of active pixels per line.
Top	Adjusts the top edge of output blanking. A setting of 1 indicates that no output lines that are normally visible should be blanked, 2 causes the first output line to be blanked, etc.
Bottom	Adjusts the bottom edge of blanking. For example 1080 indicates that no output lines that are normally visible in the 1125(1080)/29I output standard should be blanked, 1079 causes the last output line to be blanked, etc. Note that the preset value will vary with the output standard as it is equal to the number of active lines per frame.

MATRIX

Allows the colorimetry on the output signal to be set.



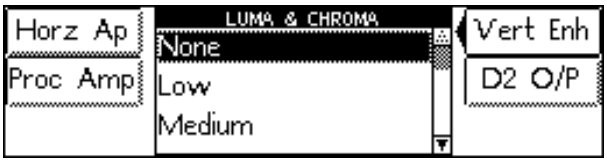
The colour correction options are:

Auto	Automatically selects the colorimetry most appropriate for the output video standard.
REC 601	No colour space conversion is applied.
SMPTE 240	Colorimetry to SMPTE 240 requirements is applied.
SMPTE 274	Colorimetry to SMPTE 274 requirements is applied.
BT709	Colorimetry to BT709 requirements is applied.
None	No correction

CONTROL

(Additional items when Encoder Option fitted)

The D2 O/P menu item becomes available when the Encoder option is fitted to the HD6200 unit.



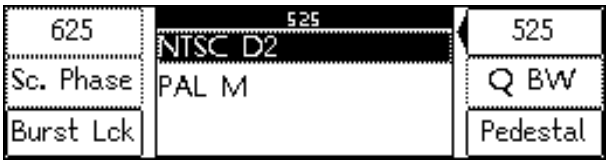
D2 O/P
This menu selection allows the encoder options of the unit to be set.

625

This allows selection of the encoder output video standard when the HD6200 output standard is set to 625(576)/25i. The options are as follows:

PAL D2 PAL N

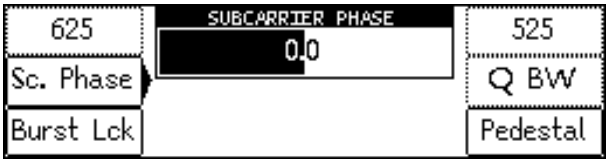
525



This allows selection of the encoder output video standard when the HD6200 output standard is set to 525(480)/29i. The options are as follows:

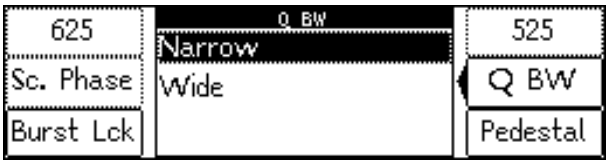
NTSC D2 PAL M

Sc. Phase
This allows adjustment of the subcarrier phasing with respect to the reference in steps of 0.1 degree.
Overall range is -180.0° to 179.9°



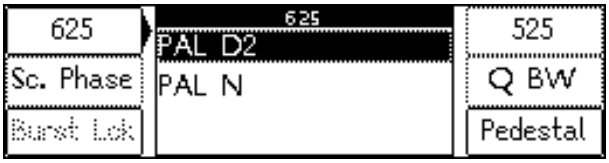
Selecting Preset returns the setting to the calibrated value of 0.

Q BW
In NTSC mode only, the bandwidth of the Q signal may selected as Wide or Narrow.



Pedestal
In NTSC mode only, the option of adding a pedestal of 7.5 IRE (54 mV) to the video output can be achieved.

Burst Lock
This allows the HD6200 to genlock to an external reference signal which may be either a black burst or a standard composite colour video signal.



When Burst Lock is selected the unit regardless of the current genlock status will only use external reference B for genlocking. The unit will only achieve burst lock, if genlock is enabled and a black burst or composite video signal of the currently selected output standard is present on the reference B input. Selection of reference source and standard will be unavailable whilst in burst lock mode.

When Burst Lock is de-selected the previous genlock status of the unit will be resumed.

Additional Standards available when Encoder option fitted

525(480)/29i

625(576)/25i

625(576)/24sF

625(576)/23sF

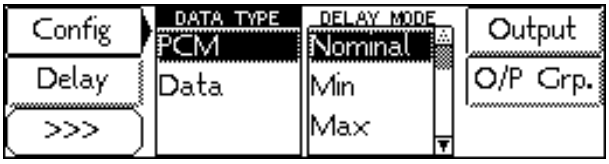
AUDIO (Optional)

This menu is used to control all the HD6200 functions related to the audio processing blocks.

Note that if this option is not fitted the display will show the words "Feature not fitted"

There are four stereo pair processing blocks that may be assigned to any four of the input and output groups.

Individual or group control of the audio delay of the embedded or AES audio paths is possible.



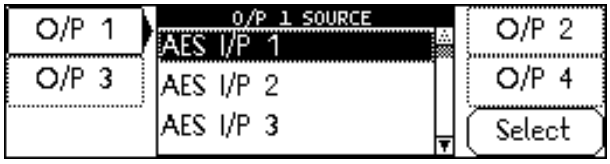
PCM — this mode should normally be selected. Audio rate conversion is used to accommodate differing input and output video/audio rates

Data — in this case the audio is treated as a data stream that cannot be rate converted. This is useful if the audio is a compressed format such as Dolby-E. Because the audio is not rate converted this mode will only work if the input and output audio clocks are locked together. This is most easily achieved if the HD6200 is genlocked to its video input and, the incoming data stream is also locked to the video input. This can also be done by locking the HD6200 to an external reference that also drives the audio source.

Note that if the embedded audio input channels are being used, the embedded audio must also be synchronized to the input video. If the AES audio inputs are in use, the input audio need not be locked to the input video but, it must be locked to the HD6200 output video.

If the audio contains a mix of PCM and Data channels then the HD6200 should be put into data mode and, both the data and PCM audio input channels should have their audio clocks locked to the HD6200 output.

Output

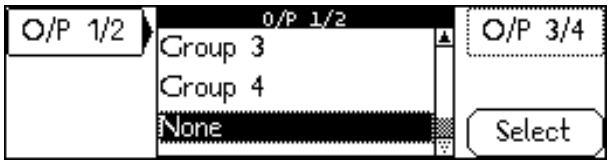


This selects the source for the selected output channel.
The options for each source are:

AES I/P 1	Inputs from rear panel
AES I/P 2	
AES I/P 3	
AES I/P 4	
Disembed CH 1/2	Input from embedded audio in programmes
Disembed CH 3/4	
Disembed CH 5/6	
Disembed CH 7/8	
Disembed CH 9/10	
Disembed CH 11/12	
Disembed CH 13/14	
Disembed CH 15/16	
Tone	A 1kHz test tone
Mute	Silence

Output Grp.

For the embbeded outputs this selects the group to embed the pair on.



Options are:

Group 1

Group 2

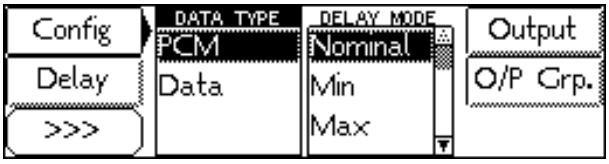
Group 3

Group 4

None

Note - embedded audio is not available for slow PAL video standards. (625/24sF and 625/23sF). Thus, if the input is slow PAL, embedded audio input is not possible. If the output is slow PAL, embedded audio output is not possible. The AES/EBU audio inputs and outputs are however always available.

Delay



DELAY MODE

Used to control the delay applied to the audio as it passes through the machine. The audio delay applied comprises two components; the machine automatic delay which compensates for the delay in video processing, and any additional delay the user wishes to apply to compensate for upstream or downstream video processing delays.

The menu controls the way in which the automatic audio delay works. The video delay through the machine depends on many variables. If the unit is not running with its input and output locked together then the processing delay may be variable – if the unit is in Synchronise or Optimise mode.

The options are:

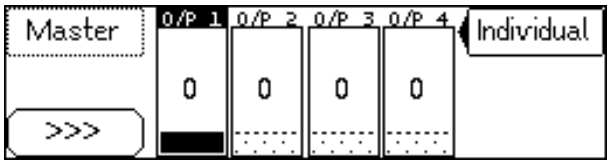
Nominal — The automatic audio delay is set to the nominal value for the conversion being undertaken. This is the average video delay that can be incurred. This will be the same as the actual video delay for conversions that have the input and output frame rates locked together and, the vertical genlock timing set so that the output and input vertical syncs are roughly co-timed.

Min — The audio delay is set to the minimum video processing delay that can be incurred for the conversion being undertaken.

Max — The audio delay is set to the maximum video processing delay that can be incurred for the conversion being undertaken.

Zero — The audio delay is set to zero and the user can set the entire audio delay using the AUDIO – MAN DEL menu

The audio channels (AES or embedded) may be delayed either individually or via a master control that is added to the individual settings.

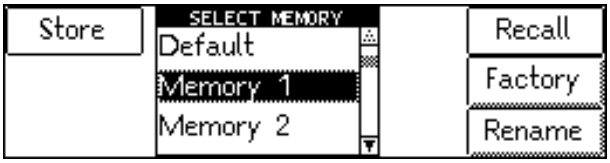


This allows the user to apply a manual offset to the audio delay setting. This offset can be positive or negative, thus allowing the user to increase or decrease the audio delay as required. The audio delay offset is added to the automatic audio delay to provide the total audio delay.

The audio delay range when the automatic audio delay mode is set to ZERO is 0 to 500ms. The actual audio delay applied is the sum of the automatic delay and the manual delay. For example, if the automatic delay works out to be 64ms the manual delay range will be –64ms to 436ms.

MEMORY

This menu is used to store and recall the various system Memories. There are eight system memories available. Each memory contains a complete record of the machine settings (including the display memory settings).



The current machine setting is stored in the system memory. This will be recalled on powering-up (it can't be recalled by the user). If the user recalls a user-memory, its setting will be copied to the system memory, i.e. the previous system setting gets lost. All machine settings, except the following, can be stored to / recalled from individual user memories:
Status of "action buttons" (like "Store", "Rename", "Recall") are not stored in any memory
System status like temperature, Timecode etc. are not stored in any memory
The names of memories, the selection of current memory, the GPI enable selection, the RollTrack addresses and the service controls are only stored on a system base (i.e. they don't change on recalling a user-memory).
Input and output active values are remembered for the last standard selection while the unit is powered on.

STORE
Stores the system settings in the memory selected.

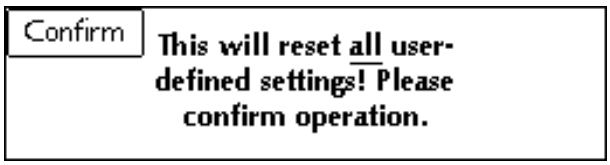
RECALL
Changes the system settings to those stored in the memory selected.

The memory options are:

Default
Memory 1
Memory 2
Memory 3
Memory 4
Memory 5
Memory 6
Memory 7
Memory 8

The Default memory can only be recalled, it cannot be stored. When the Default memory is recalled, all the unit settings are restored to the factory default values. The other memory contents are however left untouched.

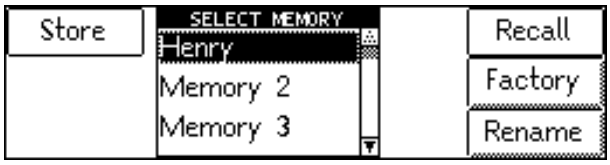
FACTORY
This allows the machine to be set back to the factory defaults state. In this case all settings are put back to their factory preset values. In addition, all machine memories are also set back to the factory default values. This function requires the user to hit the confirm button to ensure that it is not accidentally pressed. To avoid clearing the memory contents, use the Default memory recall described above.



RENAME

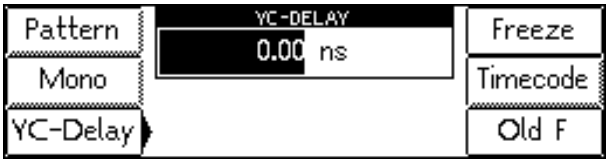
The 8 memories may be renamed using the standard edit string dialog.

Selecting ACCEPT will accept the new name.



UTILS

Controls the various utility functions the HD6200 provides. The menu functions are shown below:



PATTERN

Used to control the internal test pattern generator.

The selected pattern is only active when Enable is highlighted by pressing the upper left-hand button ❒ (toggle action).

The test pattern options are:

100% Bars

75% Bars

SMPTE Bars

Tartan

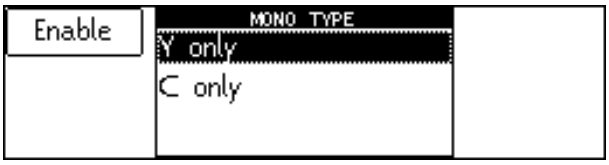
Ramp

Sweep

Pulse & Bar

MONOCHROME

Controls the monochrome output functions.



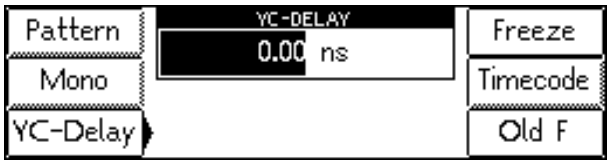
The menu options are as follows:

Y only

C only

To activate monochrome output of the selected type, press the upper left button ❒ adjacent to Enable.

Y/C DELAY



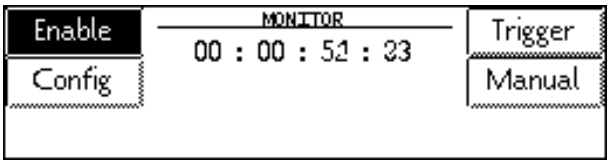
This controls delay placed in the chroma channel to correct for input timing errors. The resolution is dependent on the conversion being performed. Careful use is required to ensure Y and C and co-timed at the colour space converter.

FREEZE

Used to control the HD6200 picture freeze function.

Pressing the top right-hand button manually toggles between freeze and no freeze.

TIMECODE



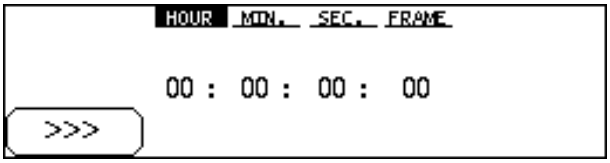
This is the home screen for timecode control, the central area of the screen gives an indication of the input timecode. If no timecode is present the last valid input is flashed.

The HD6200 can perform complex timecode manipulation and it can synchronize this with output film sequence generation. The operation of the timecode and film sequence system is described in more detail in the Application note "HD6200 Timecode operation" attached to the end of this manual.

ENABLE

This turns on the insertion of timecode in the HD6200 video output.

TRIGGER



This sets the input timecode value for subsequent *trigger* events.

CONFIG

This menu sets the configuration of the output timecode insertion.

SYNCHRONISATION

This determines how the output timecode is synchronised.

Manual

Control from manual dialog, i.e. reset to zero, load the preload value or calculate a Synchro timecode and insert it.

Zero

When the input time code reaches the *trigger* value the output timecode is reset to zero.

Preload

When the input time code reaches the *trigger* value the output timecode is set to the *preload* value.

Synchro

When the User presses the Synchro button in the Manual section of the timecode menus, the HD6200 will examine the Trigger timecode, the Preload timecode and the current input video timecode. It will then calculate new Trigger and Preload values a few seconds in advance of the current input timecode such that, when the input video reaches the Trigger value the output timecode will have the Preload value. This allows the unit to generate continuous timecode in advance of a Trigger/Preload point provided continuous timecode is applied to the input of the unit. For further information see the timecode application note attached to this manual

Echo

When the input time code reaches the *trigger* value the output timecode is set to the *trigger* value.

E-E

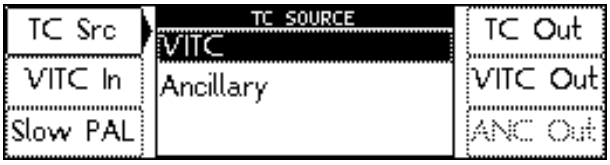
The input timecode is fed directly through to the output, this is only appropriate in IO locked mode. Note that under certain circumstances the timecode frame count at the HD6200 output may not accurately reflect the input video timecode. However the seconds count should be correct.

DROP FRM

This enables the output of drop frame timecode from the HD6200. This option is not available if the output video standard has a 25 or 50Hz frame rate or, the unit is in E-E mode.

SD

These menus control the reading and inserting of timecode for **standard definition** input and output standards. These menus may not be visible if the HD6200 does not have SD options fitted.

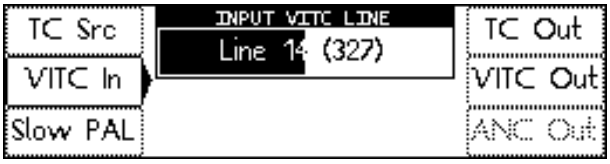


TC SRC

VITC The input video timecode is read from VITC signals.

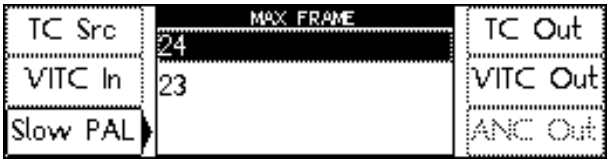
Ancillary The input video timecode is read from embedded ancillary data.

VITC In



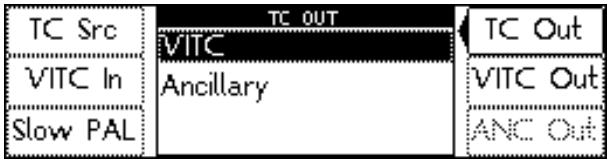
This menu controls the input video line from which the input video VITC is read.

Slow PAL



This menu controls whether the timecode for 625/24sF and 625/23sF video standards counts from frame 0 to frame 24 or, from frame 0 to frame 23. Note that this menu setting affects both the input and output timecode.

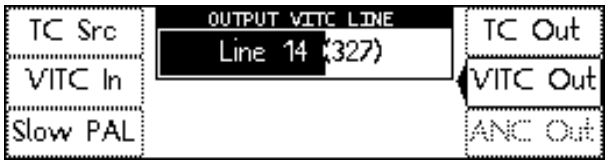
TC OUT



VITC The output video timecode is inserted as VITC signals.

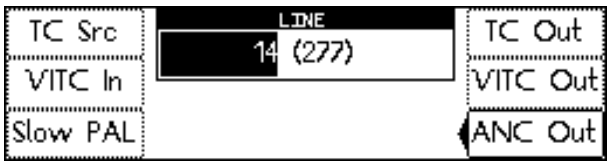
Ancillary The input video timecode is inserted as embedded ancillary data.

VITC Out



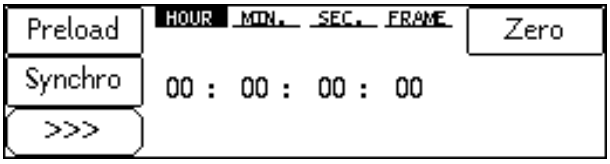
This menu controls the output video line on which the output VITC is inserted. Note that the VITC is inserted on two lines per field. This menu setting specifies the first line that has VITC inserted on it. The second line of VITC is inserted two lines after the first line.

ANC Out



This sets the line number on which embedded ancillary timecode is inserted.

MANUAL



This menu page allows the entry of a timecode Preload value using the knob and the select arrows button. Note that this timecode is always in the correct format for the HD6200 output video standard.
If the Zero button is pressed the output timecode will immediately be set to all Zeroes and will then free run.

If the Preload button is pressed the output timecode will immediately be set to the Preload value that has been entered on this menu page and will then free run.

If the Synchro button is pressed and the synchronization mode has been set to Synchro (see above), the HD6200 will examine the Trigger timecode, the Preload timecode and the current input video timecode. It will then calculate new Trigger and Preload values a few seconds in advance of the current input timecode such that, when the input video reaches the Trigger value the output timecode will have the Preload value. Three or four seconds after the Synchro button has been pressed the
The output timecode will be set to the internally calculated value and will then free run.

OLD F

This is a toggle button that may be of use when driving older equipment if the output interlace looks incorrect.

SETUP (Config)

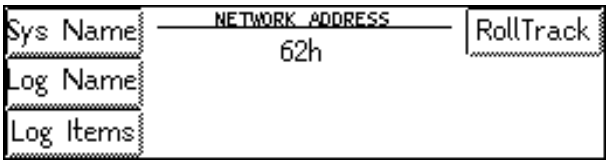
Provides additional machine setup items.

Info

INFO

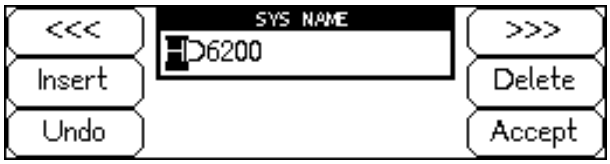
This will display the product code, the software release version number and the release date.

ROLLCALL
Allows the unit name and logging information to be set. The current RollCall address (in Hex) is displayed when RollCall is selected.



Note that this address must be set using switches on the main board (see Section 3, under RollCall) and this menu can only display the address, not change it.

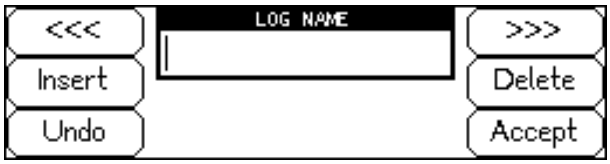
SYSTEM NAME
Sets the RollCall unit name. The default is 'HD6200'. The character selected for editing will be highlighted.



To edit a different character press either the upper left-hand button adjacent to '<<<' or the upper right-hand button adjacent to '>>>'. Once the character is selected turning the front panel knob changes the character.

Pressing the middle left-hand button adjacent to 'Insert' adds a space character to the name at the highlight position. Pressing the middle right-hand button adjacent to 'Delete' removes a character from the name at the highlight position. Pressing the bottom left-hand button adjacent to 'Undo' returns the name to its value when the Sys Name menu was last entered. Pressing the bottom right-hand button adjacent to 'Accept' makes the changes active.

LOG NAME
If the HD6200 is attached to a RollCall network with a logging device, information about various parameters can be made available to the logging device.



If the Log Name is blank (obtained by pressing the PRESET button) and the cursor is at the left (no spaces), logging information is available to all logging devices on the RollCall network. If Log Name is set to the name of a particular logging device, only that device will receive information. The log name can be edited as described in the Sys Name section above.

LOG ITEMS

Selecting this item reveals a display that allows information about five parameters to be made available for logging.

The Log Items are:

Input Status	When activated, a loss of input signal condition will be indicated to the logging device.
Input Standard	When activated, the current input standard will be available to the logging device.
Reference Status	When activated, a loss of reference signal condition will be indicated to the logging device.
Output Standard	When activated, the current output standard will be available to the logging device.
Picture	When activated, the current state of the output picture (i.e. pattern, normal, frozen) will be available for the logging device.

Select the parameter to be changed using the front panel knob. Pressing the bottom right-hand button ❒ adjacent to ‘Select ’ toggles the status of the selected parameter. Enabled parameters will be marked.

ROLLTRACK

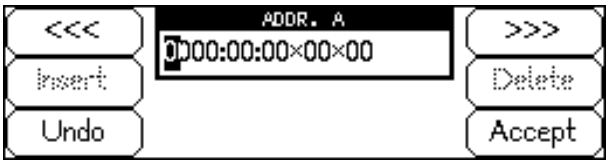
The RollTrack function allows the HD6200 to automatically control remote audio/video delay modules using the RollCall system.

As the delay through the HD6200 varies according to the conversion underway, delay modules connected via the RollTrack system will automatically have their delay updated to match.

The delay sent out via the RollTrack system matches the internal audio delay of the HD6200. Thus, it will be equal to the sum of the automatic internal delay and the user controlled manual delay setting (see audio setup section).
For more detailed information, see Section 7 RollTrack Audio Delay Tracking.

The destination for the delay information is set from the RollTrack address as follows:

Selecting RollTrack provides a sub-menu that allows up to 6 audio delays to be selected as a destination. Selecting any of the 6 Address buttons produces an address editing menu as shown below.



The menu provides a string that looks like this:

0000:00:00x00x00

network address (usually 0000) in hex

0000:00:00x00x00

enclosure address in hex

0000:00:00x00x00

slot address of delay module in hex

0000:00:00x00x00

the connection or channel number in decimal

0000:00:00x00x00

the unit ID

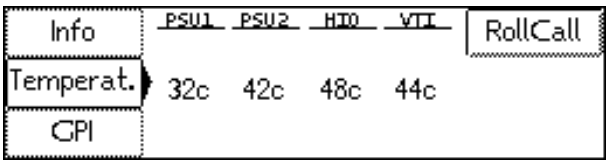
For more detailed information, see Section 7 RollTrack Audio Delay Tracking.

In a typical setup, the network address will be 0000, the enclosure and slot address would match those of the destination module, and the channel number would be one of 14,15,16 or 17 and the unit ID would be left at 00.

The HD6200 RollTrack output becomes active as soon as the enclosure address is set to be non-zero and the Accept button is pressed.

Note that if the Accept button is not pressed at the end of editing the string, the changes will not take effect.

TEMPERATURE
Displays the current temperature of the power supplies and the main printed circuit boards.



The indications are:

PSU1

PSU2

HIO board

VTI board

GPI
Determines whether the General Purpose Interface is active or not. There are two positions, GPI disabled and GPI enabled.

Note that this menu item is not stored in the HD6200 machine memories. This prevents the GPI from disabling itself when a GPI memory recall is undertaken.

RollCall Templates for the HD6200

Input

This screen is related to the input signal selection and control.

Standard

This allows the standard of the input video to be selected.
The standards are named using the convention: - total number of lines (active lines)/ frame rate.

The options are:

Auto	The machine automatically determines the input video standard.	
750(720)/60p	1125(1080)/30I	Forces the input to the selected standard
750(720)/59p	1125(1080)/30p	
750(720)/50p	1125(1080)/30sF	
750(720)/30p	1125(1080)/29i	
750(720)/29p	1125(1080)/29p	
750(720)/25p	1125(1080)/29sF	
750(720)/24p	1125(1080)/25i	
750(720)/23p	1125(1080)/25p	
750(576)/50p	1125(1080)/25sF	
750(480)/60p	1125(1080)/24p	
750(480)/59p	1125(1080)/24sF	
525(480)/29i	1125(1080)/23p	
625(576)/25i	1125(1080)/23sF	
625(576)/24sF	1125(1035)/30i	
625(576)/23sF	1125(1035)/29i	

Note - not all the listed standards may appear on the list, as they may not be available if the appropriate HD6200 option is not fitted.

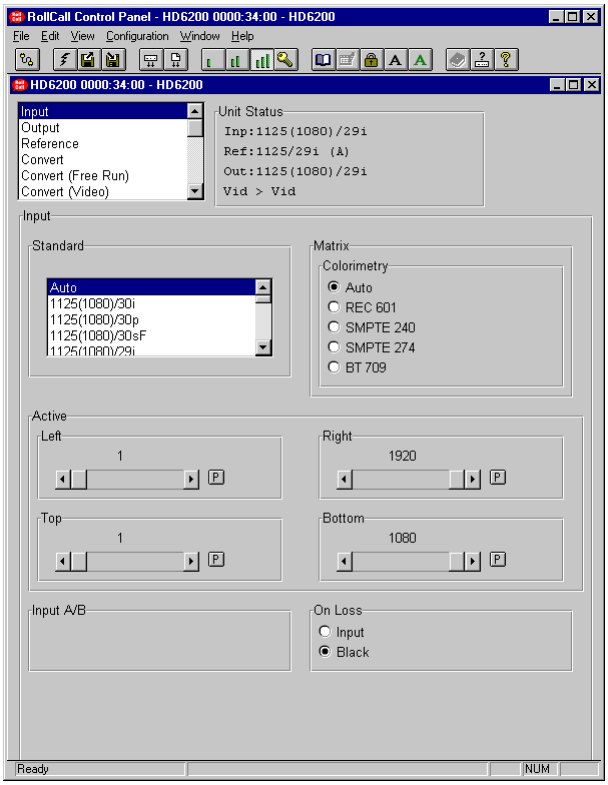
The selected standard will appear on the first line of the Unit Status area.

Note that for this and other screens the following applies:

The  symbol represents the Preset function and will return the function to the default setting.

The  and  symbols at the ends of the scroll bar allow the value to be adjusted in discrete steps.

The value will be shown above the scroll bars.



Matrix

This allows the colorimetry on the input signal to be set.

The colour correction options are:

Auto	Automatically selects the colorimetry most appropriate for the output video standard.
REC 601	Colorimetry to REC 601 requirements is applied.
SMPTE 240	Colorimetry to SMPTE 240 requirements is applied.
SMPTE 274	Colorimetry to SMPTE 274 requirements is applied.
BT709	Colorimetry to BT709 requirements is applied.

Input (continued)

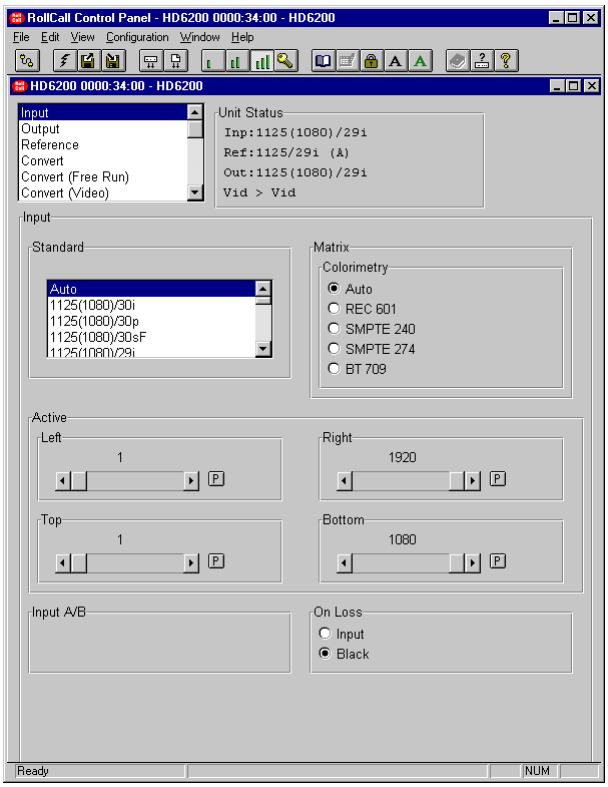
Active

This function allows adjustment of input blanking. It is used where the source video is known to have pixels/lines at the edge of the picture that are not required to be displayed. When set, the machine will blank any output data generated by the input data, regardless of the display control settings.

Note that the HD6200 keeps a separate record of input blanking for each distinct input active picture raster.

The settings are as follows:

Left	Adjusts the left-hand edge of blanking. A setting of 1 indicates that no input pixels that are normally visible should be blanked, 2 causes the first input pixel to be blanked, etc.
Right	Adjusts the right-hand edge of blanking. A value equal to the number of active pixels per line in the current input standard indicates that no input pixels that are normally visible should be blanked. Subtracting 1 from this causes the last input pixel to be blanked, etc.
Top	Adjusts the top edge of blanking. A setting of 1 indicates that no input lines that are normally visible should be blanked, 2 causes the first input line to be blanked, etc.
Bottom	Adjusts the bottom edge of blanking. A value equal to the number of active pixels per line in the current input standard indicates that no input lines that are normally visible should be blanked. Subtracting 1 from this causes the last input line to be blanked, etc.



Input A/B

This allows the selection of a serial input.
Note - this menu item will not be visible if the HD6200 is not fitted with two serial inputs.

On Loss

This controls the system response to a loss of input signal.

The options on loss of signal are:

Input	The incoming signal will be displayed whenever possible.
Black	The output will cut to black

Output

The functions in this screen are all related to the output signal standard and control.

Standard

This allows selection of the output video standard. The standards are named using the following convention: total number of lines, (active lines), frame rate. For an HD6200 fitted with High Definition output capability the following standards are available: -

750(720)/60p	1125(1080)/30I
750(720)/59p	1125(1080)/30p
750(720)/50p	1125(1080)/30sF
750(720)/30p	1125(1080)/29i
750(720)/29p	1125(1080)/29p
750(720)/25p	1125(1080)/29sF
750(720)/24p	1125(1080)/25i
750(720)/23p	1125(1080)/25p
750(576)/50p	1125(1080)/25sF
750(480)/60p	1125(1080)/24p
750(480)/59p	1125(1080)/24sF
	1125(1080)/23p
	1125(1080)/23sF
	1125(1035)/30i
	1125(1035)/29i

For an HD6200 fitted with Standard Definition output capability the following standards are available: -

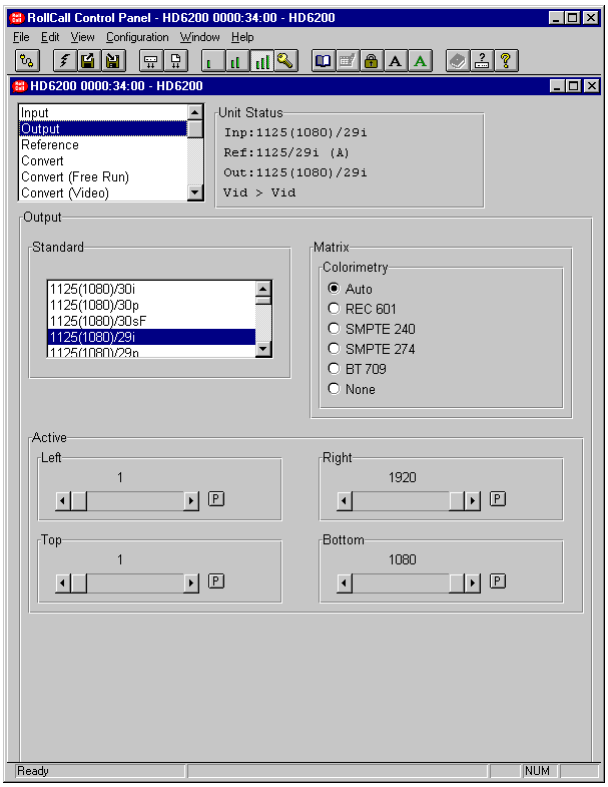
525(480)/29i

625(576)/25i

625(576)/24sF

625(576)/23sF

The selected standard will appear on the third line of the Unit Status area.



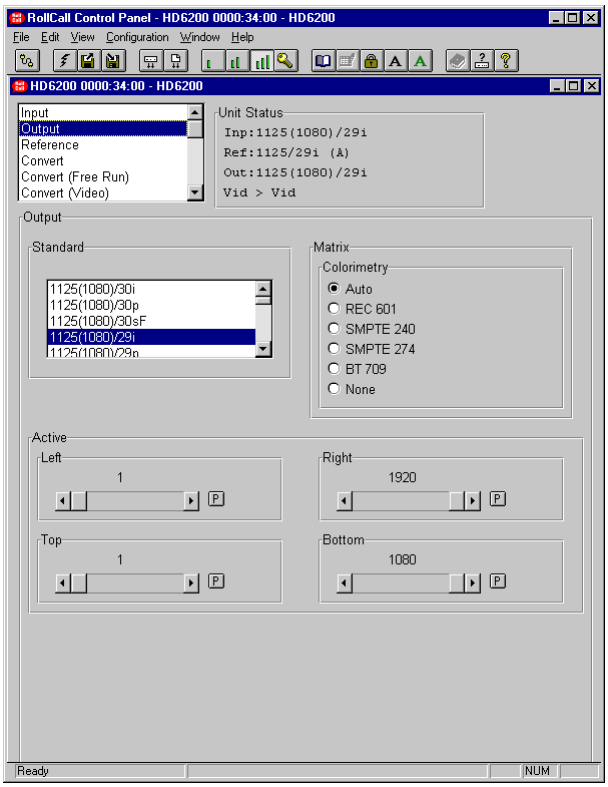
Matrix

This allows the colorimetry on the output signal to be set.

The colour correction options are:

Auto	Automatically selects the colorimetry most appropriate for the output video standard.
REC 601	No colour space conversion is applied.
SMPTE 240	Colorimetry to SMPTE 240 requirements is applied.
SMPTE 274	Colorimetry to SMPTE 274 requirements is applied.
BT709	Colorimetry to BT709 requirements is applied.
None	No correction

Output (continued)



Active

Allows the user to adjust the output blanking. Output blanking is used when it is required that ranges of output lines or pixels are never active. For example, it is possible to impose an artificial letterbox by bringing the top output blanking down and the bottom output blanking up.

Note that the HD6200 keeps a separate record of output blanking for each distinct output active picture raster.

Left — Adjusts the left-hand edge of output blanking. A setting of 1 indicates that no output pixels that are normally visible should be blanked, 2 causes the first output pixel to be blanked, etc.

Right — Adjusts the right-hand edge of blanking. For example, 1920 indicates that no output pixels that are normally visible should be blanked in the 1125(1080)/29I output standard. 1919 causes the last output pixel to be blanked, etc.

Note that the preset value will vary with the output standard as it is equal to the number of active pixels per line.

Top — Adjusts the top edge of output blanking. A setting of 1 indicates that no output lines that are normally visible should be blanked, 2 causes the first output line to be blanked, etc.

Bottom — Adjusts the bottom edge of blanking. For example 1080 indicates that no output lines that are normally visible in the 1125(1080)/29I output standard should be blanked, 1079 causes the last output line to be blanked, etc.

Note that the preset value will vary with the output standard as it is equal to the number of active lines per frame.

Reference

This screen is used to control the genlocking functions of the HD6200.

Enable

This item toggles between genlocking ON and genlocking OFF.

Source

Selects the source of the reference signal. Options are:

Auto	The HD6200 will scan the Reference-A input, the Reference-B input and the Input video until it finds a suitable reference signal. If a new search of the available reference inputs is required, toggling the genlock enable button will cause a new search to begin at Ref A.
Ref A	Forces the HD6200 to operate from the external reference A input.
Ref B	Forces the HD6200 to operate from the external reference B input.
Input	Forces the HD6200 to lock to the video input.

Note - if the encoder output option has been fitted to the HD6200 and it is required to burst lock the unit, the Black burst reference must be applied to Ref B. See the OUTPUT-CONTROL - D2 O/P menu item for more information.

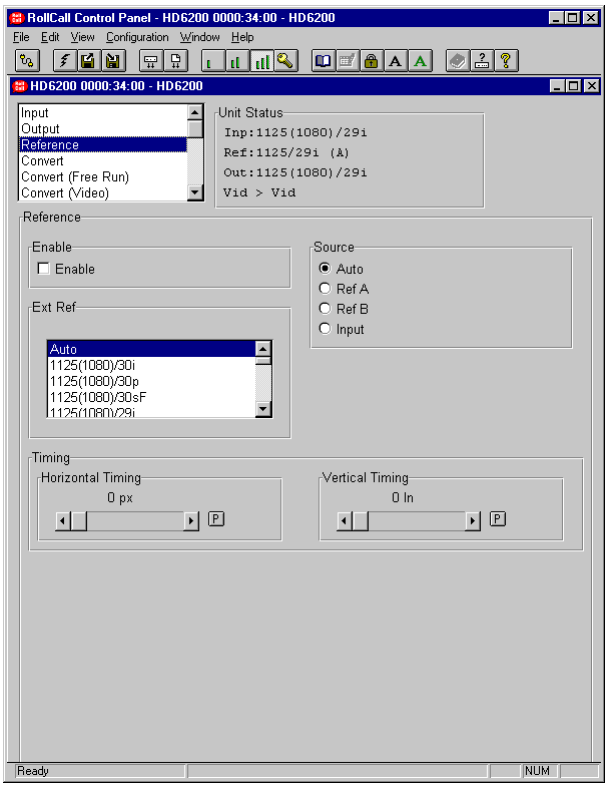
Timing

This menu allows the adjustment of the genlock timing with respect to the selected reference signal. The options are:

Horizontal Timing	Adjusts horizontal genlock timing. Range is zero to one output line in steps of one output pixel.
Vertical Timing	Adjusts vertical genlock timing. Range is zero to one output frame in steps of one output line.

Ext Ref

Sets the reference standard. The selected standard will appear on the second line of the Unit Status area.



The user can force the reference standard to the required value or select Auto. The full range of references is as follows:

Auto	The HD6200 measures the selected reference signal and automatically chooses the reference standard.	
750(720)/60p	1125(1080)/30I	Forces the reference standard selected
750(720)/59p	1125(1080)/30p	
750(720)/50p	1125(1080)/30sF	
750(720)/30p	1125(1080)/29i	
750(720)/29p	1125(1080)/29p	
750(720)/25p	1125(1080)/29sF	
750(720)/24p	1125(1080)/25i	
750(720)/23p	1125(1080)/25p	
750(576)/50p	1125(1080)/25sF	
750(480)/60p	1125(1080)/24p	
750(480)/59p	1125(1080)/24sF	
525(480)/29i	1125(1080)/23p	
625(576)/25i	1125(1080)/23sF	
625(576)/24sF	1125(1035)/30i	
625(576)/23sF	1125(1035)/29i	

Convert

This screen relates to the conversion of the input signal to the output signal.

Mode

The HD6200 has a number of processing modes and it is important to use the correct mode to achieve the desired conversion.

For full details please see page 4.6

Flag Source

The selects the source of the film sequence information for the input video stream.

For full details please see page 4.9.

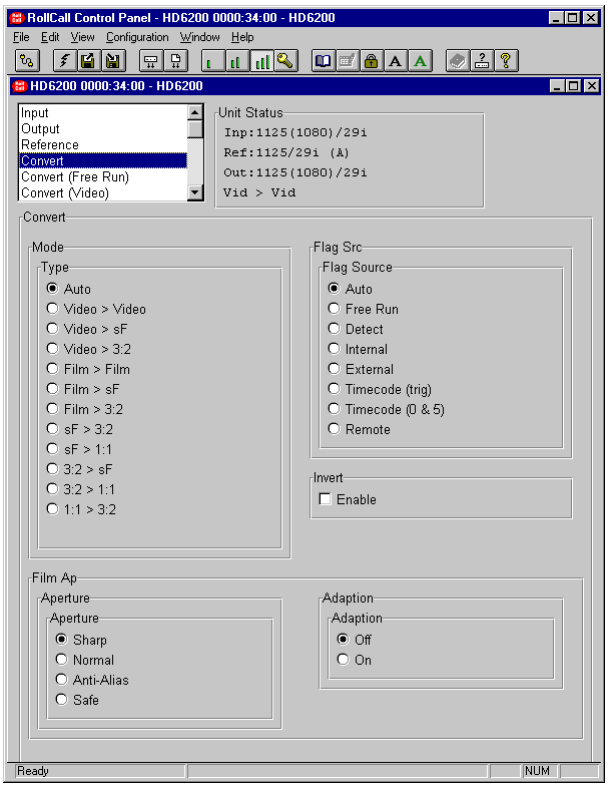
Invert

If the input film sequence source has been set to INTERNAL the INVERT button controls the dominance of the internal (2:2) film sequence generator. For input material with normal dominance INVERT should be OFF. For material with inverted dominance, INVERT should be ON. Normal dominance occurs when a frame is made by field ones and the following field twos. Inverted dominance occurs when a frame is made by field twos and the following field ones

Film Ap(erture)

These items control the filter apertures used when the HD6200 is in a conversion mode that treats the incoming material as film. In these modes the HD6200 will treat the material as individual film frames and will not interpolate across frame boundaries.

For full details please see page 4.13.



Convert (Free Run)

Free Run

These items are used to set up the internal free running **input** film sequence generator and, the **output** internal 3:3 sequence generator.

TYPE	This sets up the internal **input** film sequence generator.
AUTO	The HD6200 will use the input video standard to determine the free running sequence type.
2:2	The free run generator is forced to make 2:2 (sF) film sequence.
3:2	The free run generator is forced to make 3:2 film sequence.

3:2 Reset

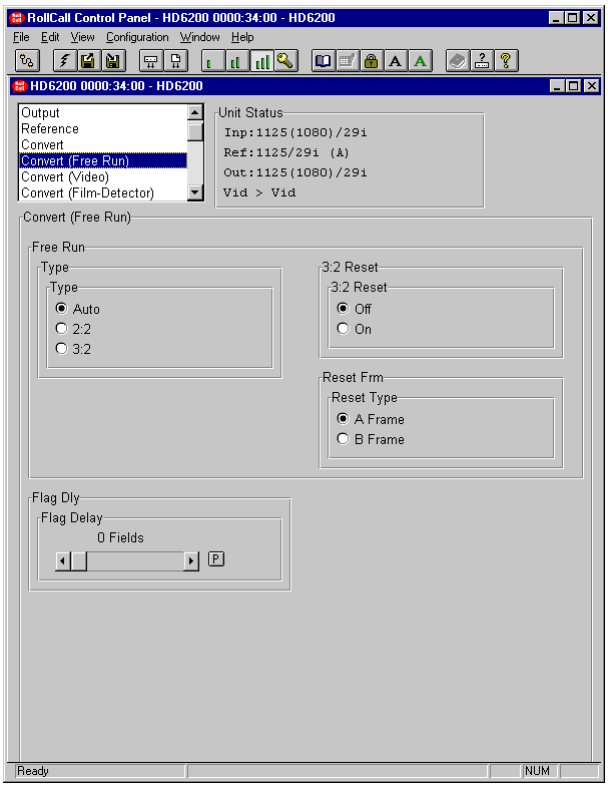
This sets up the internal output 3:2 film sequence generator. If the HD6200 internal 3:2 sequence generator is in use (in conversion modes Video>3:2,Film>3:2,sF>3:2 and 1:1>3:2) then the phase of the 3:2 generator can be reset using the input and output timecode values (see UTILS-TIMECODE section).

Off	The internal 3:2 sequence generator cannot be reset by timecode.
On	The internal 3:2 sequence generator can be reset by timecode.

Reset Frm

This sets up the reset phase of the internal **output** 3:2 film sequence generator if the 3:2 RESET menu item above has been set top ON.

A Frame	When the internal output 3:2 generator is reset it makes an A Frame.
B Frame	When the internal output 3:2 generator is reset it makes an B Frame.



Flag Delay

This is used to align the free running film sequence pulse with the incoming video. The adjustment represents the number of fields of delay applied to the free running pulse train.

This is used to align the free running film sequence pulse with the incoming video. The adjustment represents the number of fields of delay applied to the free running pulse train.

If the free running pulse is of 3:2 type then the correct delay will be a value between 0 and 4 fields inclusive. If the pulse is of 2:2 type then there are only two possible phases. Thus setting the delay to 0,2 or 4 produce one phase and setting the delay to 1 or 3 produces the alternate phase.

Note that this setting has effect when the flag source is set to Free Run, Timecode (Trig) or Timecode (0 & 5).

Convert (Video)

Video Control

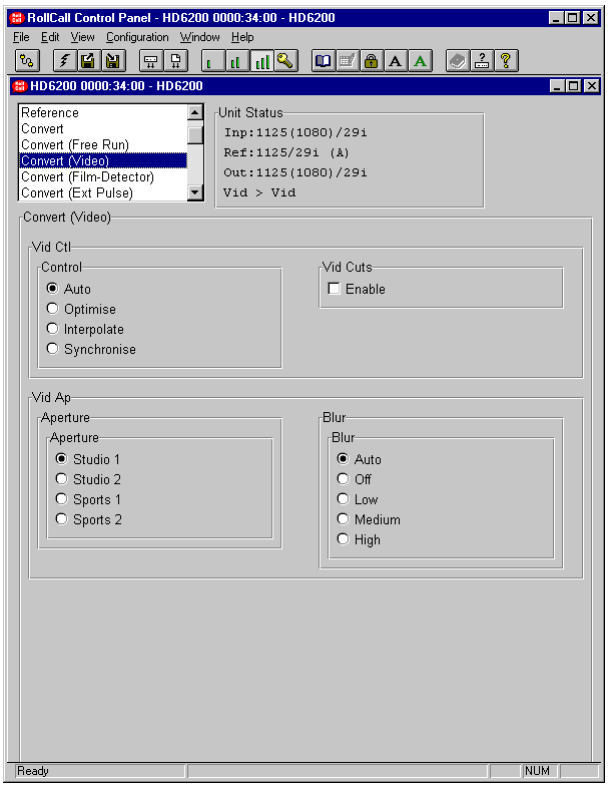
The following menu items are all related to the temporal conversion of video (not film) based signals. The HD6200 contains a video synchronizer for conversions where the input and output field rates are not locked together. These settings also affect the way that the synchronization is performed.

The options are as follows:

Auto	Selects Synchronise mode when the input and output field rates are the same and optimise mode when they are different.
Optimise	The unit operates as in the Synchronise mode but monitors the amount of slippage between the input and output timing. When the slippage exceeds a preset value the unit performs an interpolation to move to the next available minimum blur temporal position. The effect of this is to give the same high performance as the Synchronise mode but without periodically discarding or repeating a field; for example, in 59.94 to 60Hz mode only about half a second of interpolation occurs in every 16 seconds. However, because of the system used, the video delay through the machine can vary by up to plus or minus half a field.
Interpolate	The output is always interpolated from the input. This will give the smoothest output but at the expense of potential blurring of moving objects.
Synchronise	Gives the highest performance with minimum output blurring. If the input and output field rates are not identical it can cause field drops or repeats which may have the effect of causing moving objects to judder.

Video Cuts

If VIDEO CUTS are enabled then an internal scene change detector is employed to try and ensure that interpolation is not done across scene changes. Note that this setting only affects the performance if the HD6200 is in a video input mode. i.e. Video > Video, Video > sF or Video > 3:2.



Video Aperture

The video aperture control varies the temporal filter shape. The options are:

Studio 1	The most diffuse temporal aperture. Useful for stills and slow-moving video with fading cuts.
Studio 2 Sports1	↓
Sports 2	The sharpest temporal aperture. Appropriate for fast-moving material with fast pans and field-based cuts, etc.

Blur

The blur control adjusts the amount of temporal low pass filtering applied to the video input. This can be used to adjust the output picture temporal sharpness to achieve the desired look. This control can also be useful for conversions such as Video>sF and Video>3:2. For some combinations of input and output standards (e.g 525/59.94 in and 1080/23sF out) the conversion can produce undesirable low frequency beat frequencies on the output. These can be reduced by increasing the Blur setting to Medium or High.

Auto	The HD6200 uses the input and output standards to determine the optimum blur setting. This will give the best result for most conversions.
Off	The minimum possible amount of blur is produced.
Low, medium, High	These have gradually increasing amounts of blur.

Convert (Film-Detector)

This item controls the operation of the internal film sequence detector.

Window

The HD6200 film sequence detection circuit operates over a windowed section of the input picture. By default the whole of the input image lies within the window. However, it may be desirable to exclude certain areas of the picture from the window. To facilitate this, the window can be made visible on the HD6200 output video so that it can easily be adjusted.

Note, the window is applied to the HD6200 input video so it is advisable to have all of the input video visible when making the adjustment. For example, by selecting a full height display (see DISPLAY-PRESETS menu).

Enable

This turns the film sequence window on and off. This should be set to off, except when adjusting the sequence window, or the HD6200 output will be incorrect.

Type

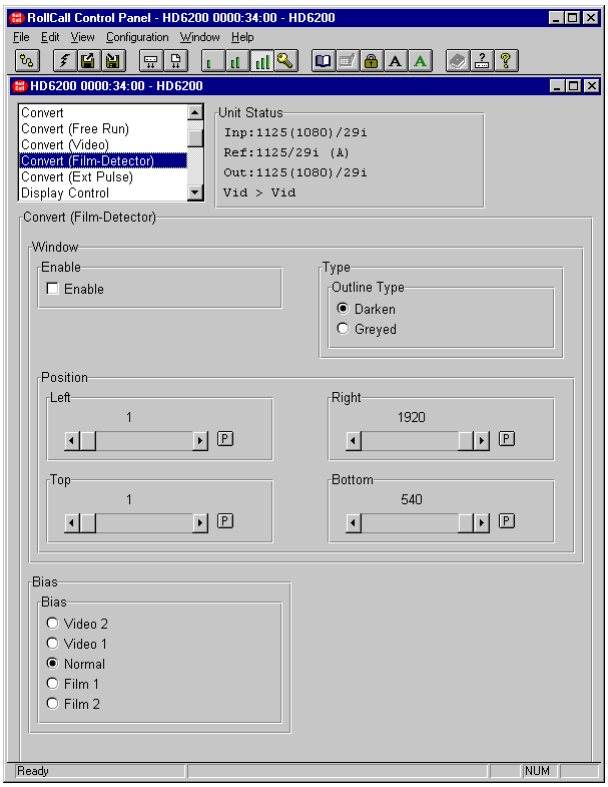
This controls the appearance of the sequence window when it is visible.

The options are:

Darken	The gain of video inside the window is reduced.
Greyed	The video inside the window is monochrome.

Position

Left	Adjusts the left-hand edge of the window in pixel increments.
Right	Adjusts the right-hand edge of the window in pixel increments.
Top	Adjusts the top edge of the window in 1 line increments.
Bottom	Adjusts the bottom edge of the window in 1 line increments.



Bias

This item adjusts the bias of the internal film sequence detector. This should not normally be necessary, the Normal setting works well on most material. However, on difficult material it can be used to steer the detector towards the correct answer. If the bias is adjusted towards video it is more likely to detect orphan fields. If the bias is adjusted away from video and towards film it is less likely to generate orphan fields and more likely to generate repeat fields.

This can be particularly useful on Varispeed material. If the playback speed is high then the detector can be adjusted towards video to help find any orphan fields. If the playback speed is low then the detector can be adjusted towards film to help find any extra repeat fields. The default setting is Normal. Video 1 adds a small bias towards finding orphan fields. Video 2 adds a larger bias towards orphan fields. Film 1 adds a small bias towards repeat fields. Film 2 adds a larger bias towards repeat fields.

Convert (Ext Pulse)

These items are used to set up the input and output TTL film pulses on the HD6200 rear panel BNCs.

In Type

This item selects what type of pulse is being applied to the input film sequence pulse BNC.

New Frame	If New Frame is selected the HD6200 expects a pulse which indicates that a new film frame has been produced by the Telecine. This is also known as a Start of Frame pulse or a Read Frame Sequence pulse.
Repeat	If Repeat is selected the HD6200 expects a pulse which indicates that a repeat field has been produced by the Telecine.

In Sense

This item selects the electrical form that the input film sequence pulse takes.

Positive	Selects a pulse that is active HI during a new or repeat field.
Negative	selects a pulse which is active LO during a new or repeat

Out Type

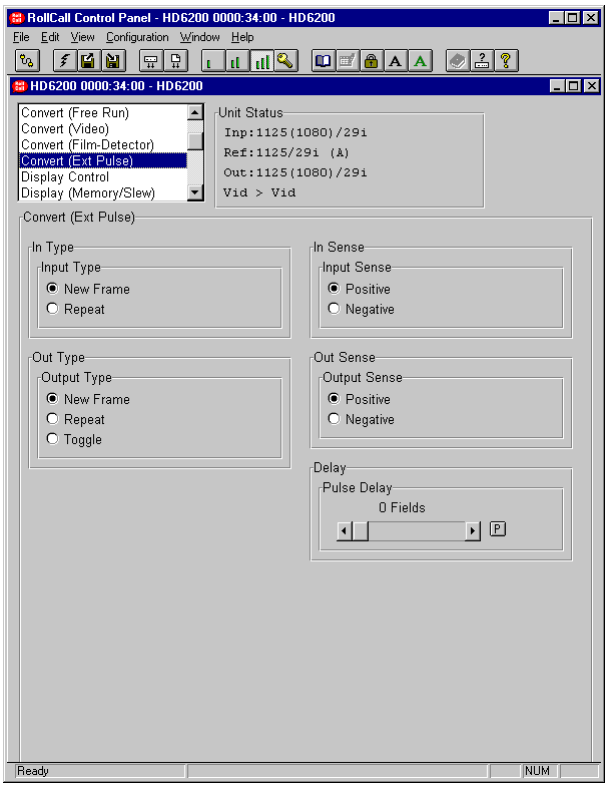
This item selects what type of pulse is being applied to the output film sequence pulse BNC.

New Frame	If New Frame is selected the HD6200 outputs a pulse which indicates that a new film frame has been produced by the HD6200
Repeat	if Repeat is selected the HD6200 outputs a pulse which indicates that a repeat field has been produced by the HD6200.
Toggle	if Toggle is selected the HD6200 outputs a pulse that toggles every time a new film frame is produced by the HD6200.

Out Sense

This item selects the electrical form that the output film sequence pulse takes.

Positive	Selects a pulse that is active HI during a new or repeat field.
Negative	Selects a pulse that is active LO during a new or repeat field.



Delay

This sets the number of input fields of delay that are applied to the incoming film sequence pulse. This allows the user to set the timing of the pulse so that it matches the incoming video sequence. Thus, if there is a video processing delay between the Telecine and the HD6200 then this can be compensated for with this setting. Up to 15 input fields of delay can be applied to the incoming pulse.

Display Control

This item is used to control the size, shape and position of the output picture.

Presets

This allows selection of the preset display sizes.

The options are:

Anamorphic This setting retains all picture information from the input and passes it to fill the output image regardless of the aspect ratio conversion. This means that 16:9 to 4:3 conversions will appear squeezed horizontally.

Full Height *For 4:3 to 16:9 aspect ratio conversions only.* Produces a 4:3 output with all input picture information retained and blanked columns to the left and right of the image.

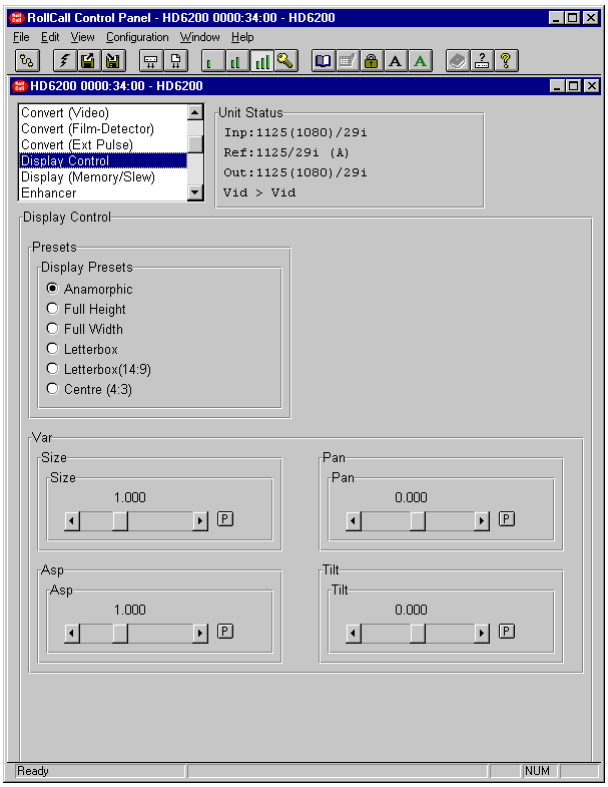
Full Width Produces a 16:9 output. The whole output screen is filled and information at the top and bottom of the input image may be lost. Used when converting a 4:3 image to a 16:9 display when it is necessary to fill the entire output display.

Letterbox *For 16:9 to 4:3 aspect ratio conversions only*. To maintain the correct shape of objects on the 16:9 input, this displays the 16:9 picture as a strip across the centre of the 4:3 display.

Letterbox (14:9) *For 16:9 to 4:3 aspect ratio conversions only*. To display as large a picture as possible without losing too much of the 16:9 picture, the sides are cropped slightly.

Centre (4:3) For 16:9 to 4:3 aspect ratio conversions only. To maintain the correct shape of objects on the 16:9 input, this setting retains all vertical detail but crops the left and right edges of the image.

For more details please see page 4.15.



Var

This allows the picture size, shape and position to be adjusted to meet custom requirements.

The options are:

Size

This adjusts the size of the whole image.
Both vertical and horizontal size change together while maintaining the aspect ratio of the image.

Pan

This adjusts the horizontal position of the output image.

Asp

This adjusts the horizontal size of the image, allowing the shape (aspect ratio) of the output image to be changed.

Tilt

Adjusts the vertical position of the output image.

Display (Memory/Slew)

Memory

This item is used to store and recall the various User Display memories. There are four User Display memories available in each of the eight machine memories. Each User Display memory contains the Size, Aspect ratio, Pan and Tilt parameters of the image.

Store

Selecting this item will store the settings in the selected User Display memory location.

Recall

Selecting this item will recall the settings from the selected User Display memory location.

Slew

This controls the method and the timing of a picture size change.

If Slew is not zero and there is no trigger, when a change of aspect ratio is made it will slew from one to another with the specified profile and duration. This will also occur if another memory is selected, which has a different aspect ratio.

Profile

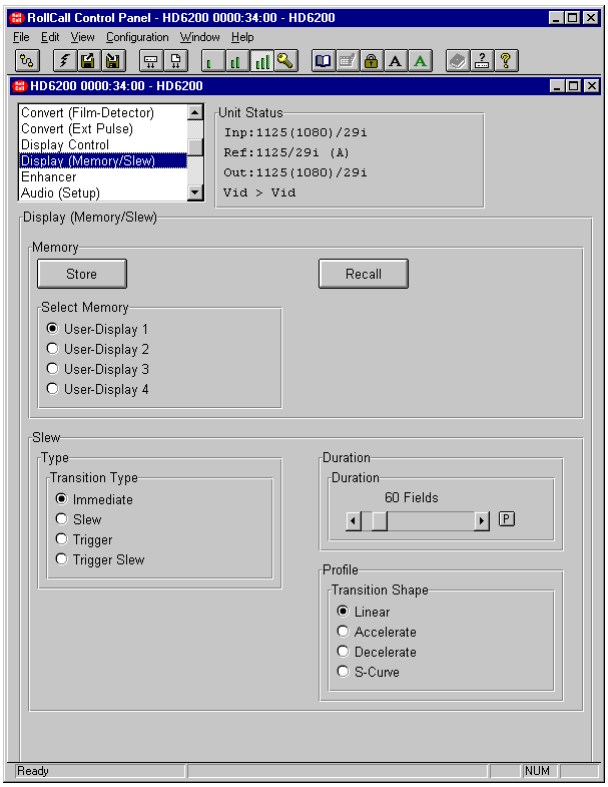
Selects the “shape” of the transition.

The options are:

Linear	The rate of change of the picture parameters is constant throughout the transition.
Accelerate	The rate of change of the picture parameters increases throughout the transition.
Decelerate	The rate of change of the picture parameters decreases throughout the transition.
S-Curve	The rate of change increases and then decreases as the transition progresses.

Duration

This sets the duration of the transition in fields or frames if the output video standard is interlaced or progressive respectively.



Transition Type

Selects the type of transition that will be performed. Options are:

Immediate	Transition from one picture size to another is instantaneous.
Slew	Transition from one picture size to the next occurs at a speed set by the DISPLAY-SLEW-DURATION menu and follows a profile set by the DISPLAY-SLEW-PROFILE menu.
Trigger	Transition from one picture size to the next only occurs when a trigger command is sent down one of the remote control channels. Multiple picture parameters can be set in advance and then activated using a single trigger command. Note that if trigger mode is selected then adjusting the picture size, shape or position from the front or remote control panel will have no effect unless a trigger command is received. Trigger mode causes an immediate transition to the next picture size.
Trigger Slew	Trigger Slew works the same as Trigger mode (above) but, instead of an immediate transition to the next picture size the transition is slewed at a speed set by the DISPLAY-SLEW-DURATION menu.

Enhancer

This function allows various enhancements to be applied to the picture.

Horizontal Enhancement

This controls the high frequency horizontal information to make the output pictures appear sharper. Options are:

Band — Selects which frequency band within the picture is enhanced, 0 corresponds to lowest frequency band, 3 is the highest.

Gain — The amount of gain applied to the band selected for enhancement before the coring process.

Core — Used to reject signals below the selected threshold before addition to the original signal. This has the effect of preventing the enhancement process from amplifying noise.

Horizontal De-Ring

This controls the de-ringing filters for both luminance and chrominance. Options are:

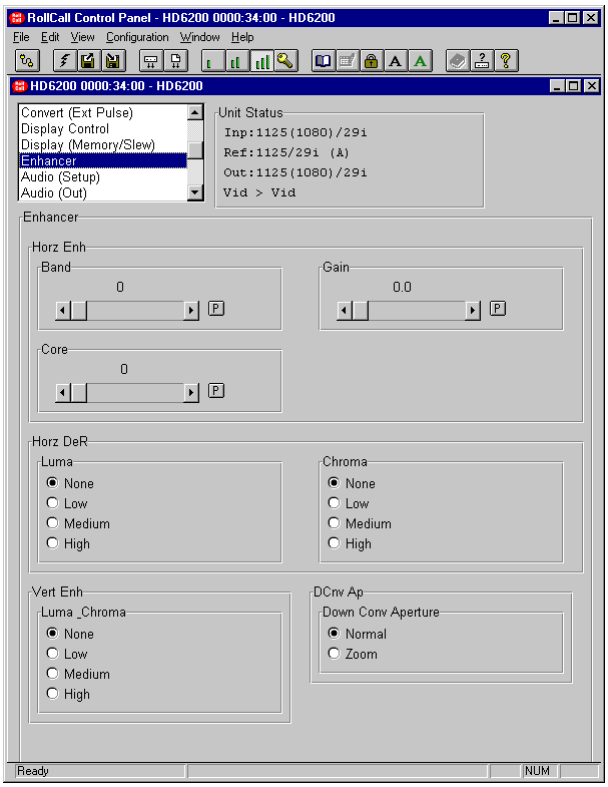
None
Low — Minimum de-ring
Medium
High — Maximum de-ring

Vertical Enhancement

This controls the detail processing in the vertical filters.

The enhancer adjusts the levels of high frequency vertical information for luminance and chrominance together to make the output pictures appear sharper or softer. Options are:

None
Low — Minimum enhancement
Medium
High — Maximum enhancement



DCnv AP

This selects the horizontal filter used when the HD6200 is being used as a down-converter i.e high definition video in, standard definition video out.

Normal — This selects an aperture that has been optimized for the normal range of down-conversions. This setting will give the best results under most circumstances.

Zoom — This aperture can be used if a very large horizontal zoom has been applied by the HD6200. e.g. if the ASP control (see DISPLAY -VAR-ASP menu setting) has been set to the maximum value. Choosing the Zoom aperture under these circumstances can provide increased horizontal resolution at the output of the HD6200.

Audio (Setup)

This menu is used to control all the HD6200 functions related to the audio processing blocks.

Note that if this option is not fitted the display will show the words "Feature not fitted"

There are four stereo pair processing blocks that may be assigned to any four of the input and output groups.

Config

Individual or group control of the audio delay of the embedded or AES audio paths is possible.

PCM — This mode should normally be selected. Audio rate conversion is used to accommodate differing input and output video/audio rates

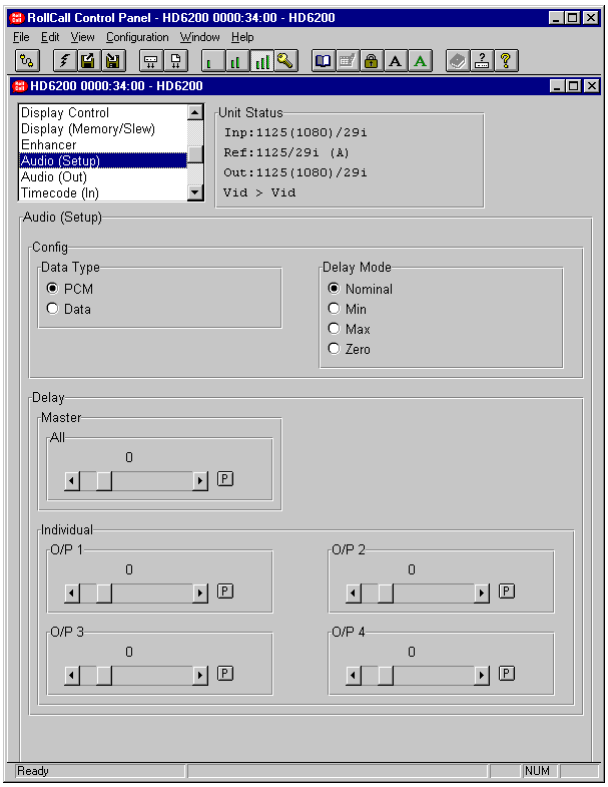
Data — In this case the audio is treated as a data stream that cannot be rate converted. This is useful if the audio is a compressed format such as Dolby-E. Because the audio is not rate converted this mode will only work if the input and output audio clocks are locked together. This is most easily achieved if the HD6200 is genlocked to its video input and, the incoming data stream is also locked to the video input. This can also be done by locking the HD6200 to an external reference that also drives the audio source.

Note that if the embedded audio input channels are being used, the embedded audio must also be synchronized to the input video. If the AES audio inputs are in use, the input audio need not be locked to the input video but, it must be locked to the HD6200 output video.

If the audio contains a mix of PCM and Data channels then the HD6200 should be put into data mode and, both the data and PCM audio input channels should have their audio clocks locked to the HD6200 output.

Delay Mode

Used to control the delay applied to the audio as it passes through the machine. The audio delay applied comprises two components; the machine automatic delay which compensates for the delay in video processing, and any additional delay the user wishes to apply to compensate for upstream or downstream video processing delays.



Delay Mode (continued)

This item controls the way in which the automatic audio delay works. The video delay through the machine depends on many variables. If the unit is not running with its input and output locked together then the processing delay may be variable – if the unit is in Synchronise or Optimise mode.

The options are:

Nominal — The automatic audio delay is set to the nominal value for the conversion being undertaken. This is the average video delay that can be incurred. This will be the same as the actual video delay for conversions that have the input and output frame rates locked together and, the vertical genlock timing set so that the output and input vertical syncs are roughly co-timed.

Min — The audio delay is set to the minimum video processing delay that can be incurred for the conversion being undertaken.

Max — The audio delay is set to the maximum video processing delay that can be incurred for the conversion being undertaken.

Zero — The audio delay is set to zero and the user can set the entire audio delay using the AUDIO – MAN DEL menu

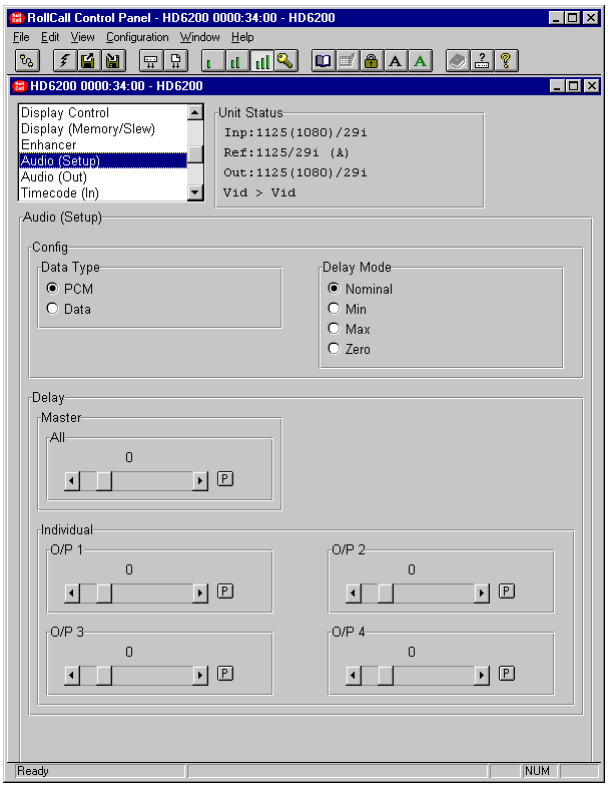
Audio (Setup) continued

Delay

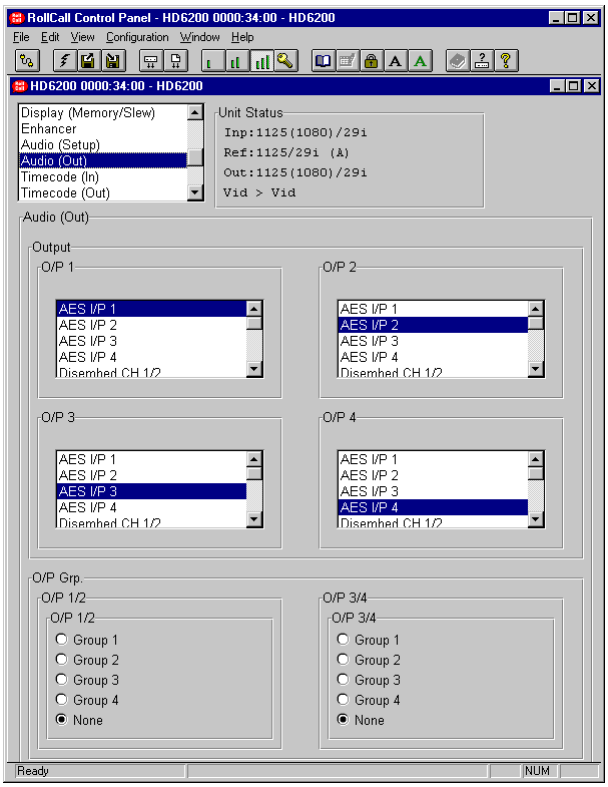
The audio channels (AES or embedded) may be delayed either individually or via a master control that is added to the individual settings.

This allows the user to apply a manual offset to the audio delay setting. This offset can be positive or negative, thus allowing the user to increase or decrease the audio delay as required. The audio delay offset is added to the automatic audio delay to provide the total audio delay.

The audio delay range when the automatic audio delay mode is set to ZERO is 0 to 500ms. The actual audio delay applied is the sum of the automatic delay and the manual delay. For example, if the automatic delay works out to be 64ms the manual delay range will be –64ms to 436ms.



Audio (Out)



Output

This selects the source for the selected output channel.
The options for each source are:

AES I/P 1	Inputs from rear panel
AES I/P 2	
AES I/P 3	
AES I/P 4	
Disembed CH 1/2	Input from embedded audio in programmes
Disembed CH 3/4	
Disembed CH 5/6	
Disembed CH 7/8	
Disembed CH 9/10	
Disembed CH 11/12	
Disembed CH 13/14	
Disembed CH 15/16	
Tone	A 1kHz test tone
Mute	Silence

Output Group.

For the embbeded outputs this selects the group to embed the pair on.

Options are:

Group 1

Group 2

Group 3

Group 4

None

Note - embedded audio is not available for slow PAL video standards. (625/24sF and 625/23sF). Thus, if the input is slow PAL, embedded audio input is not possible. If the output is slow PAL, embedded audio output is not possible. The AES/EBU audio inputs and outputs are however always available.

Timecode (In)

This item gives an indication of the input timecode. If no timecode is present the last valid input is flashed.

The HD6200 can perform complex timecode manipulation and it can synchronize this with output film sequence generation. The operation of the timecode and film sequence system is described in more detail in the Application note "HD6200 Timecode operation" attached to the end of this manual.

Trigger

This sets the input timecode value for subsequent *trigger* events.

Synchronisation

This determines how the output timecode is synchronised.

Manual

Control from manual dialog, i.e. reset to zero, load the preload value or calculate a Synchro timecode and insert it.

Zero

When the input time code reaches the *trigger* value the output timecode is reset to zero.

Preload

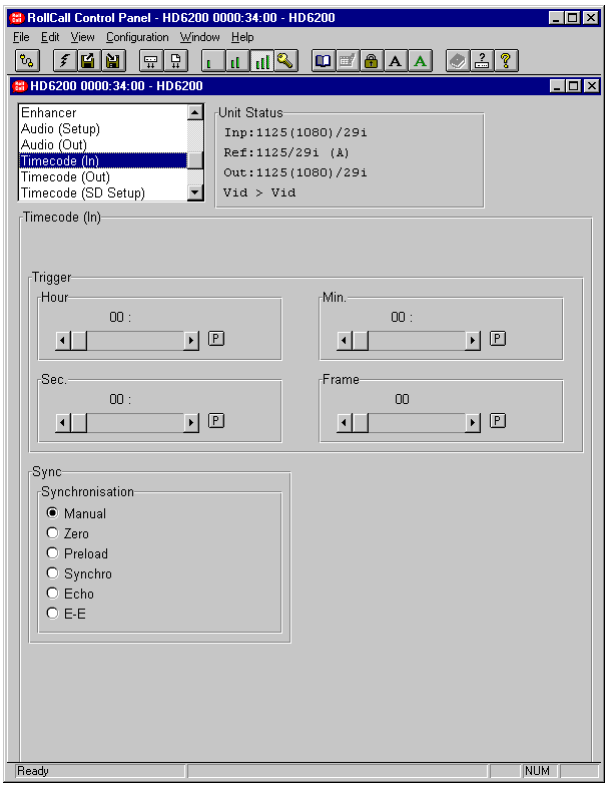
When the input time code reaches the *trigger* value the output timecode is set to the *preload* value.

Synchro

When the User selects the Synchro button in the Manual section of the timecode menus, the HD6200 will examine the Trigger timecode, the Preload timecode and the current input video timecode. It will then calculate new Trigger and Preload values a few seconds in advance of the current input timecode such that, when the input video reaches the Trigger value the output timecode will have the Preload value. This allows the unit to generate continuous timecode in advance of a Trigger/Preload point provided continuous timecode is applied to the input of the unit. For further information see the timecode application note attached to this manual.

Echo

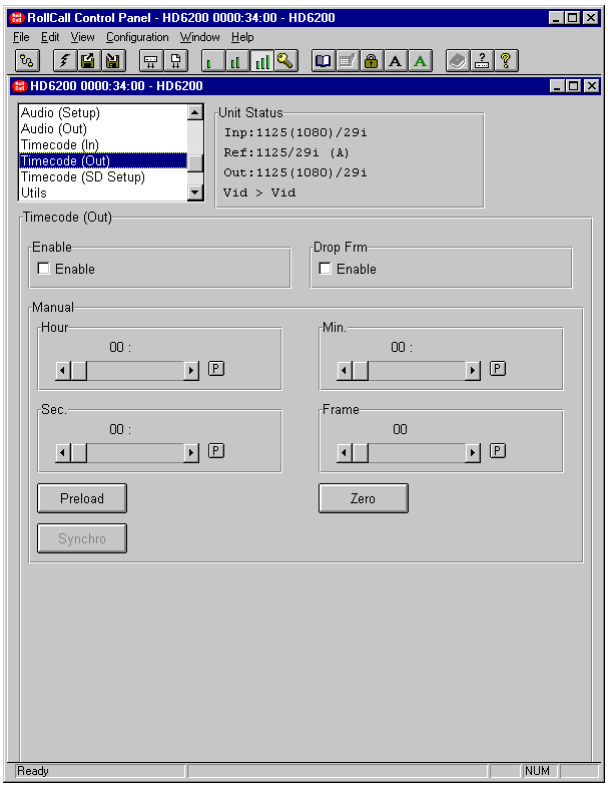
When the input time code reaches the *trigger* value the output timecode is set to the *trigger* value.



E-E

The input timecode is fed directly through to the output, this is only appropriate in IO locked mode. Note that under certain circumstances the timecode frame count at the HD6200 output may not accurately reflect the input video timecode. However the seconds count should be correct.

Timecode (Out)



Enable

This turns on the insertion of timecode in the HD6200 video output.

Drop Frm

This enables the output of drop frame timecode from the HD6200. This option is not available if the output video standard has a 25 or 50Hz frame rate or, the unit is in E-E mode.

Manual

This item allows the entry of a timecode Preload value using the knob and the select arrows button.

Note that this timecode is always in the correct format for the HD6200 output video standard.

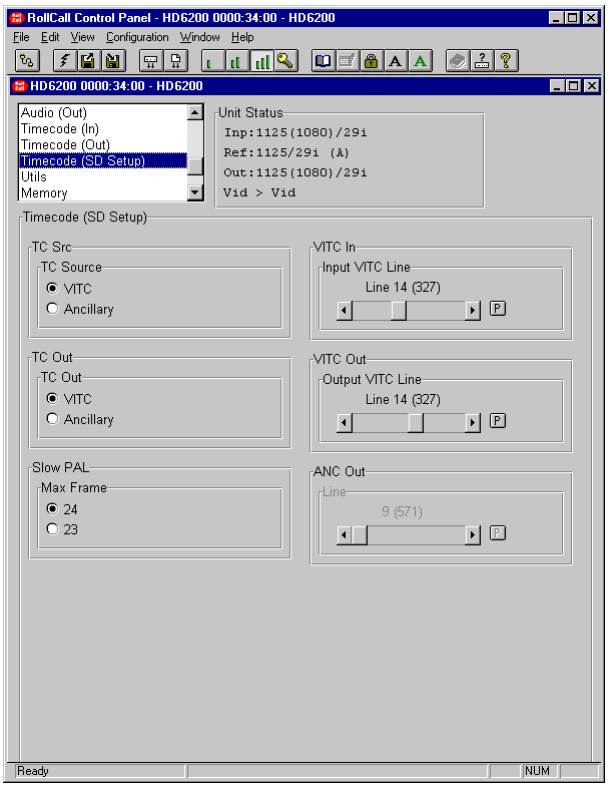
If the Zero button is selected the output timecode will immediately be set to all Zeroes and will then free run.

If the Preload button is selected the output timecode will immediately be set to the Preload value that has been entered on this menu page and will then free run.

If the Synchro button is selected and the synchronization mode has been set to Synchro (see above), the HD6200 will examine the Trigger timecode, the Preload timecode and the current input video timecode. It will then calculate new Trigger and Preload values a few seconds in advance of the current input timecode such that, when the input video reaches the Trigger value the output timecode will have the Preload value. Three or four seconds after the Synchro button has been pressed the
The output timecode will be set to the internally calculated value and will then free run.

Time Code (SD Setup)

These items control the reading and inserting of timecode for **standard definition** input and output standards. These items may not be visible if the HD6200 does not have SD options fitted.



TC Src

VITC — The input video timecode is read from VITC signals.

Ancillary — The input video timecode is read from embedded ancillary data.

VITC In

This item controls the input video line from which the input video VITC is read.

TC Out

VITC — The output video timecode is inserted as VITC signals.

Ancillary — The input video timecode is inserted as embedded ancillary data.

VITC Out

This item controls the output video line on which the output VITC is inserted. Note that the VITC is inserted on two lines per field. This item setting specifies the first line that has VITC inserted on it. The second line of VITC is inserted two lines after the first line.

Slow PAL

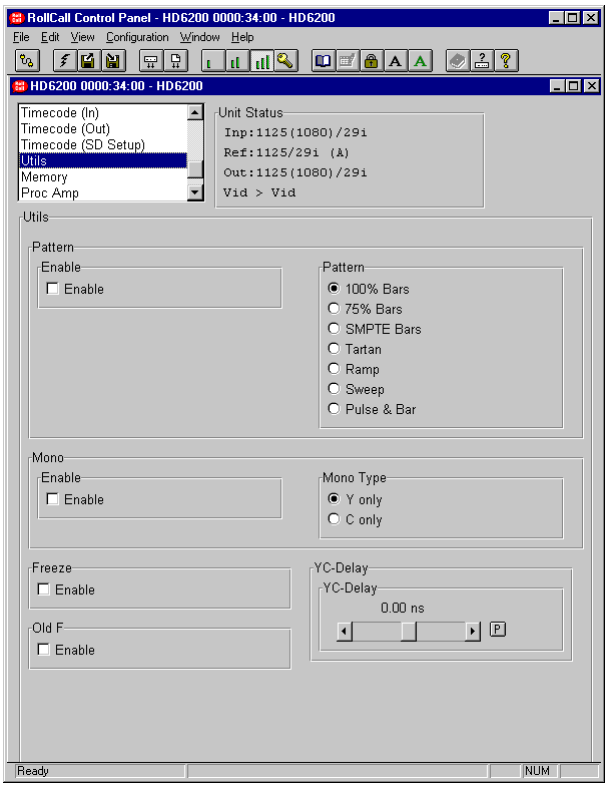
This item controls whether the timecode for 625/24sF and 625/23sF video standards counts from frame 0 to frame 24 or, from frame 0 to frame 23. Note that this item setting affects both the input and output timecode.

ANC Out

This sets the line number on which embedded ancillary timecode is inserted.

Utils

This function controls the various utility functions the HD6200 provides. The functions are shown below:



Pattern

Used to control the internal test pattern generator.

The selected pattern is only active when Enable is selected.

The test pattern options are:

100% Bars

75% Bars

SMPTE Bars

Tartan

Ramp

Sweep

Pulse & Bar

Mono/Enable

When selected the monochrome output functions will be enabled.

Mono Type

This controls the monochrome output functions.

The menu options are as follows:

Y only

C only

Freeze

Used to control the HD6200 picture freeze function.

Selecting enable manually toggles between freeze and no freeze.

Y/C Delay

This controls delay placed in the chroma channel to correct for input timing errors. The resolution is dependent on the conversion being performed. Careful use is required to ensure Y and C and co-timed at the colour space converter.

Old F

This is a toggle function that may be of use when driving older equipment if the output interlace looks incorrect.

Memory

This item is used to store and recall the various system Memories. There are eight system memories available. Each memory contains a complete record of the machine settings (including the display memory settings).

The current machine setting is stored in the system memory. This will be recalled on powering-up (it can't be recalled by the user). If the user recalls a user-memory, its setting will be copied to the system memory, i.e. the previous system setting gets lost. All machine settings, except of the following, can be stored to / recalled from individual user memories:
Status of "action buttons" (like "Store", "Rename", "Recall") are not stored in any memory
System status like temperature, Timecode etc. are not stored in any memory
The names of memories, the selection of current memory, the GPI enable selection, the RollTrack addresses and the service controls are only stored on a system base (i.e. they don't change on recalling a user-memory).
Input and output active values are remembered for the last standard selection while the unit is powered on.

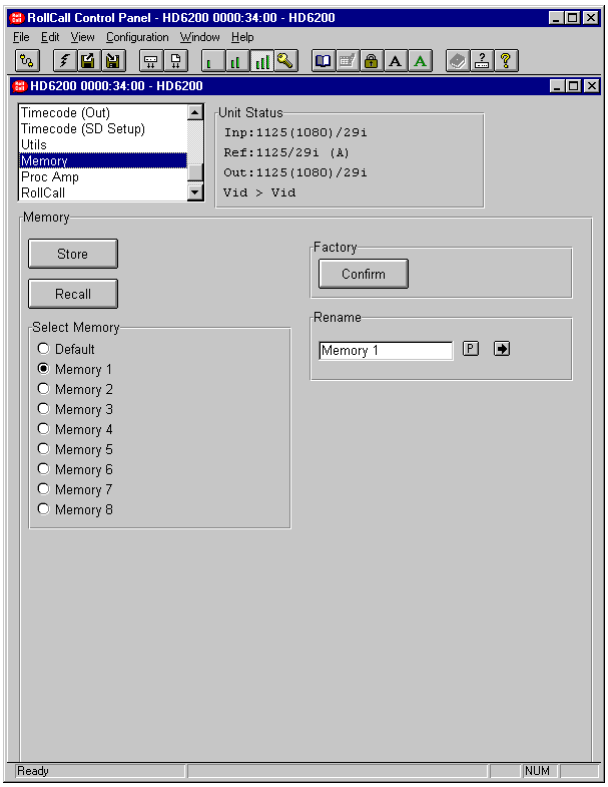
Selecting this item stores the system settings in the memory selected.

Selecting this item changes the system settings to those stored in the memory selected.

The memory options are:

Deafault
Memory 1
Memory 2
Memory 3
Memory 4
Memory 5
Memory 6
Memory 7
Memory 8

The Default memory can only be recalled, it cannot be stored. When the Default memory is recalled, all the unit settings are restored to the factory default values. The other memory contents are however left untouched.



Factory

This allows the machine to be set back to the factory defaults state. In this case all settings are put back to their factory preset values. In addition, all machine memories are also set back to the factory default values. This function requires the user to select the confirm button 

to ensure that it is not accidentally pressed. To avoid clearing the memory contents, use the Default memory recall described above.

RENAME

The 8 memories may be renamed using the standard edit string dialog.

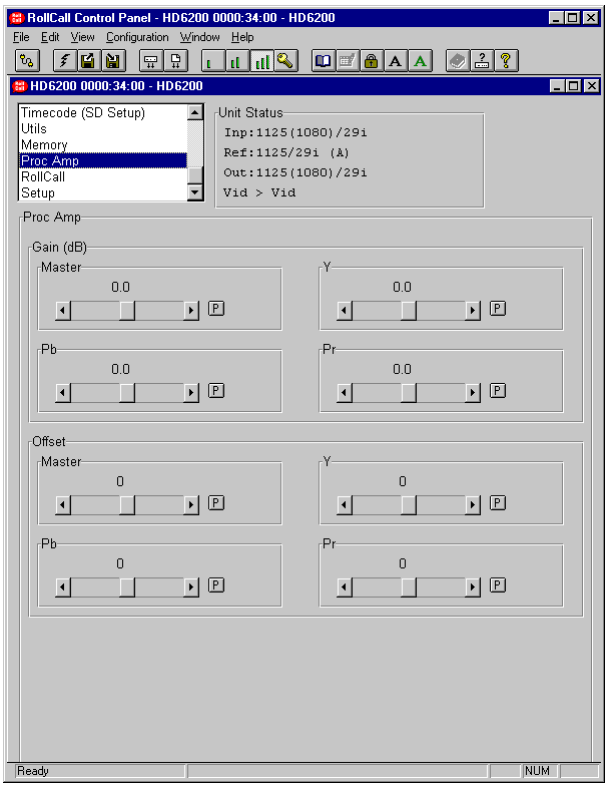
To change the memory name, type the new name in the text area and then select  (return).

Selecting Preset 

will return the text to the default name.

Proc Amp

This item allows adjustment of the gain and offset of the output video.



Gain

These items allow the user to adjust the gain of the luminance (Y), blue colour difference channel (Pb) and the red colour difference channel (Pr).

The Master gain is applied to all three channels simultaneously while the Y, Pb and Pr gains are only applied to the selected channel. Thus, the overall gain of any channel is the product of the master gain and the individual gain. The gain controls have a range of ±6dB with a preset value of 0dB.

The options are:

Master	All 3 channels adjusted simultaneously
Y Pb Pr	Individual channel adjustment

Offset

This allows adjustment of the offset for luminance (Y), blue colour difference (Pb) and red colour difference (Pr). The Master offset is applied to all three channels simultaneously while the Y, Pb and Pr offsets are only applied to the selected channel. The controls are shown in 10-bit digital video levels.

Master	All 3 channels adjusted simultaneously
Y Pb Pr	Individual channel adjustment

RollCall

If the HD6200 is attached to a RollCall network with a logging device, information about various parameters can be made available to the logging device.

This function allows the unit name and logging information to be set. The current RollCall address (in Hex) is displayed when RollCall is selected.

Note that this address must be set using switches on the main board (see Section 3, under RollCall) and this menu can only display the address, not change it.

Log Items

This item allows information about five parameters to be made available for logging.

The Log Items are:

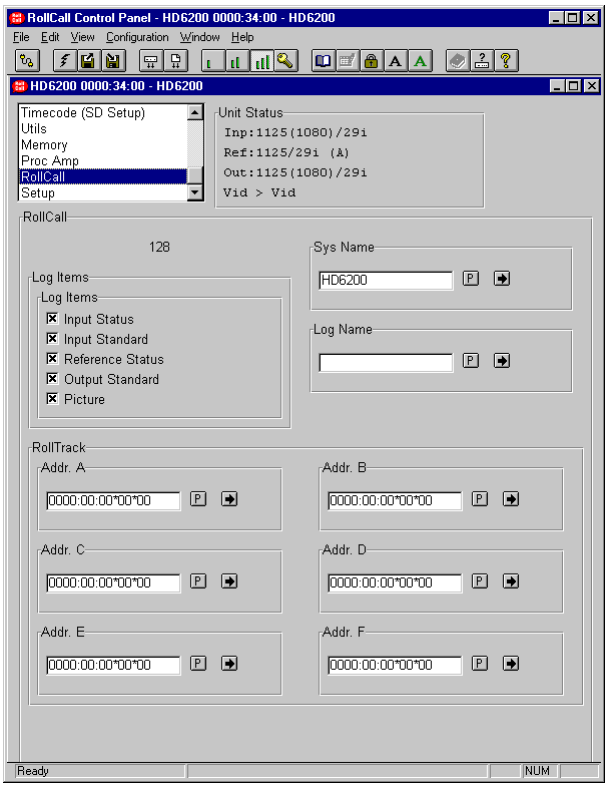
Input Status	When activated, a loss of input signal condition will be indicated to the logging device.
Input Standard	When activated, the current input standard will be available to the logging device.
Reference Status	When activated, a loss of reference signal condition will be indicated to the logging device.
Output Standard	When activated, the current output standard will be available to the logging device.
Picture	When activated, the current state of the output picture (i.e. pattern, normal, frozen) will be available for the logging device.

System Name

Sets the RollCall unit name. The default is 'HD6200'. The character selected for editing will be highlighted.

To change the name, type the new name in the text area and then select (return).

Selecting Preset P will return the text to the default name.



Log Name

If the Log Name is blank (obtained by pressing the PRESET button) and the cursor is at the left (no spaces), logging information is available to all logging devices on the RollCall network. If Log Name is set to the name of a particular logging device, only that device will receive information. The log name can be edited as described in the Sysem Name section above.

RollCall (continued)

Rolltrack

The RollTrack function allows the HD6200 to automatically control remote audio/video delay modules using the RollCall system.

As the delay through the HD6200 varies according to the conversion underway, delay modules connected via the RollTrack system will automatically have their delay updated to match.

The delay sent out via the RollTrack system matches the internal audio delay of the HD6200. Thus, it will be equal to the sum of the automatic internal delay and the user controlled manual delay setting (see audio setup section).
For more detailed information, see Section 7 RollTrack Audio Delay Tracking.

The destination for the delay information is set from the RollTrack address as follows:

RollTrack allows up to 6 audio delays to be selected as a destination.

The string that looks like this:

0000:00:00x00x00

network address (usually 0000) in hex

0000:**00**:00x00x00

enclosure address in hex

0000:00:**00**x00x00

slot address of delay module in hex

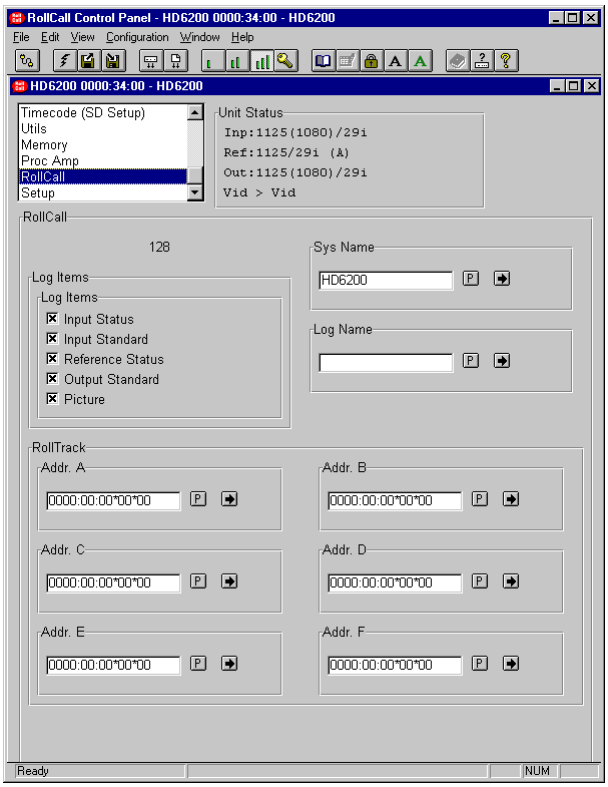
0000:00:00x**00**x00

the connection or channel number in decimal

0000:00:00x00x**00**

the unit ID

For more detailed information, see Section 7 RollTrack Audio Delay Tracking.



In a typical setup, the network address will be 0000, the enclosure and slot address would match those of the destination module, and the channel number would be one of 14,15, 16 or 17 and the unit ID would be left at 00.

The HD6200 RollTrack output becomes active as soon as the enclosure address is set to be non-zero and the Accept button is pressed.

Note that if the  *(return) button is not selected the changes will not take effect.*

Setup

This screen provides additional machine setup items.

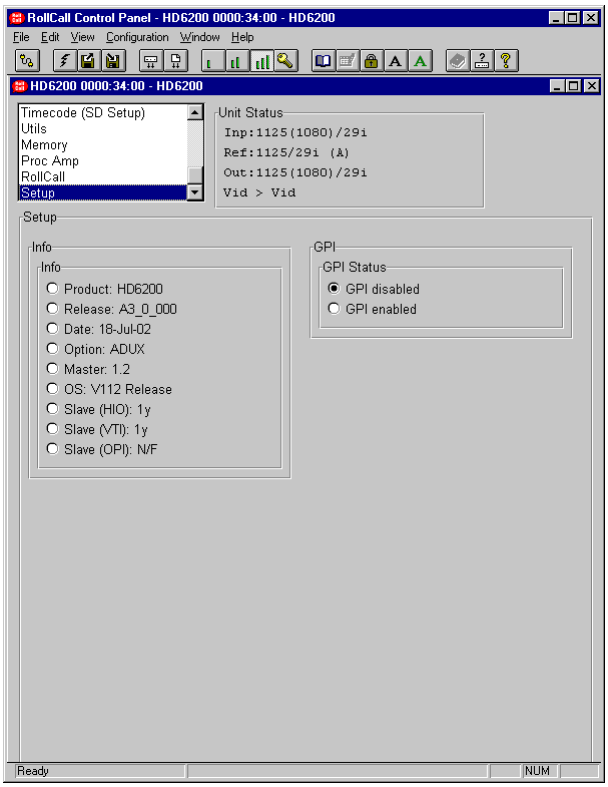
Info

This will display the product code, the software release version number and the release date.

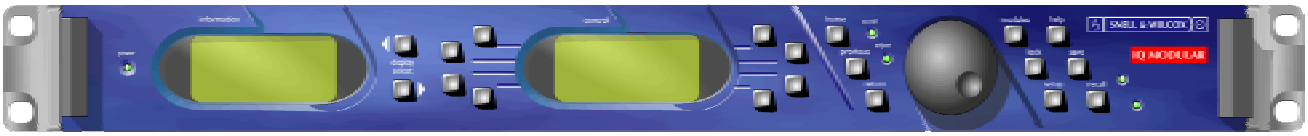
GPI/GPI Status

This determines whether the General Purpose Interface is active or not. There are two positions, GPI disabled and GPI enabled.

Note that this item is not stored in the HD6200 machine memories. This prevents the GPI from disabling itself when a GPI memory recall is undertaken.



OPERATING THE HD6200 FROM AN ACTIVE CONTROL PANEL VIA THE ROLLCALL REMOTE CONTROL SYSTEM



The Menu Structure

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

Menus are selected by push buttons adjacent to the display windows and further menu selections made by pressing a push button.

The spinwheel also allows continuously variable parameters, (where applicable) to be adjusted and the settings 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 which are displayed in the windows. The windows will display the current status of the controlled module and other information messages. (e.g. error comments, warnings etc.) and the names of the lower-level menus which may be scrolled through using the spinwheel.

A new menu may be selected by pressing the appropriate dedicated function button.

For specific operational details of the active front panel consult the operating manual supplied with the active front panel.

The menu items shown on the structure diagrams will have the same functions and ranges as those displayed on the main unit front panel.

Application Note - The HD6200 Film Modes

The HD6200 contains a number of different algorithms for processing film-based material. This document contains notes concerning the operation of the various modes and options. These notes relate to HD6200 software version A3_0_000 (released in July 2002) and onwards.

Definition of Terms

A number of terms will be used frequently in this document so they are defined here to avoid ambiguity.

Firstly, Segmented Frame (SF) video formats are the same as 2:2 film in terms of their motion profile. The term SF will be used throughout this document to refer to any 2:2 format.

Secondly, what is film and what is video in this context? The HD6200 is only concerned about the motion profile of objects in the incoming feed. Basically, it considers Video to be programme material whose contents *can* move at *every* field boundary. For example, with 525 line, 59.94 field per second source material, a camera pan will cause the scene to move 59.94 times a second. If the source material was SF, objects are only allowed to move on frame boundaries. Thus our example camera pan would only produce 29.97 different scene positions each second. Each of our input frames produces two fields, one with each sense of interlace. If the source material was 3:2 film, objects are only allowed to move after two fields, then three fields, then two fields etc. Our example camera pan would only produce 23.98 different scene positions each second.

Of course this simple definition does not hold true in practice. Still scenes could be considered as video or film. Edited and Varispeed film material can have orphan fields where there is object motion on two or more successive fields. However, these are special cases that arise when processing film material and it is usually clear whether video or film is being used.

Sequence Detection is the act of finding the film frame boundaries. For ‘perfect’ SF or 3:2 sequence, this will produce a regular pattern of new frames. For ‘non-perfect’ sequence the pattern will not be regular but might have discontinuities at edit points for example.

Why Do We Need Film Modes

There are a number of reasons why it is important to do film sequence aware picture processing during a conversion.

Firstly, it is possible to modify the conversion filters in the presence of film material to improve the interpolation process. For example, it is theoretically possible to extract more vertical resolution from the film inputs. This can improve the converter output in areas of vertical detail.

Secondly, knowledge of the positions of the film frame boundaries means that the conversion can be done with no artefacts caused by moving objects. On video material, motion compensation is required to achieve this.

Thirdly, MPEG encoders can improve their coding efficiency if they are processing 3:2 film - there is no need to encode or send the repeat field. The converter must maintain the integrity of the incoming 3:2 sequence to allow the encoder to exploit this property.

It is also very useful to be able to convert from video to film material. This allows the integration of video sequences into film material. It also gives material a ‘film look’ which can be artistically desirable.

The modes available

The HD6200 has a number of processing modes and it is important to use the correct mode to achieve the desired conversion. The mode is selected from the *Convert-Mode* menu page.

Auto
In Auto mode the HD6200 checks the input and output standards in order to work out the required processing mode. It does not analyse the incoming material to try and ascertain if it is film or video and modify the mode appropriately. Consequently it is important that the user can override the Auto setting if a particular conversion is required. In general, the HD6200 will assume that the incoming material is Video unless one of the SF input standards are being received.

Video to Video
This makes the HD6200 treat the incoming material as video and it makes no attempt to modify the temporal profile. This mode is 'safe' in that it does not depend on any film sequence information thus, it can't make the wrong decision about how to build the pictures. It will always provide good quality pictures. Note, the HD6200 should not be forced into this mode if an SF style output standard is required and the input material is video. If this is done the output will NOT be SF as it will contain object motion on every field. This could cause problems for downstream equipment. The way that this mode operates is controlled by the Video Control menu setting, which allows the user to switch between synchronising and interpolating operation.

Video to SF
This mode makes the HD6200 treat the incoming material as video but, it converts in such a way that the output only has object motion on frame boundaries. This is the mode that should be used whenever the incoming material is video and an SF style output is required.

Note some conversions can cause the output to appear to move up and down in regions of high vertical detail. This effect is produced when there is a low beat frequency between the input and output field rates. For example, 59.94 Hz video material being converted to 23.98Hz SF. This effect can be removed by adjusting the Video Blur setting (see below).

Video to 3:2
This mode is the same as Video to SF mode but, it produces an output with a 3:2 motion profile (rather than SF). All comments under Video to SF also apply to Video to 3:2 mode.

Film to Film
This mode makes the HD6200 treat the incoming material as film with a film sequence determined by the Film Sequence Timing Source menu (see below). If the input and output standards have the same frame rate then the HD6200 will endeavour to produce the same film sequence at the output as is present at the input. If the input and output frame rates are different then the output sequence will not be the same as the input but, the HD6200 will never interpolate across input frame boundaries. The performance of this mode is affected by the filter selected, the incoming film sequence and, if the internal sequence detector is being used, how successfully the sequence has been found.

In this mode the HD6200 will automatically adapt the filter in use as the incoming sequence dictates. If the film sequence detector is not in use, the HD6200 will use the single frame filter selected on the Film Filters menu (Sharp, Normal, Anti-Alias or Safe) for non-orphan fields. If the Sharp, Normal or Anti-Alias filter is selected then it will use a single field filter if it has to process an orphan field. If the Safe aperture is selected this will be used at all times as it is tolerant of both video and film.

If the internal film sequence detector is in use and Adaption has been turned On (see below), a wider range of filters can be automatically selected. This provides tolerance to video material in this mode as well as excellent film performance. This is very useful if a mix of film and video material is being provided and it is desirable to get the best possible performance. Under these conditions the Normal or Anti-Alias filters are a good choice as it provides better protection under conditions of difficult or changing programme material. Adaption also provides protection around scene changes where it can be difficult to detect the incoming film sequence.

SF to 3:2
This mode is used to convert SF material to 3:2. It is useful for converting 23.98/24Hz SF inputs to 59.94/60Hz outputs with 3:2 sequence. In this mode special care is taken to ensure the integrity of the outgoing 3:2 sequence with respect to the incoming SF. The output is guaranteed to have 3:2 sequence but this may require the repeating or dropping of input frames if the input and output are not locked together or the input SF is not correct.

If this mode is used with 720P/60 or 720P/59.94 as the output standard, then the 720P output will have a 3:2 motion profile. That is, objects will move every two frames, then every three frames etc. The net rate of new frames will be 24Hz.

In this mode the HD6200 will automatically adapt the filter in use for orphan fields if the incoming sequence makes this necessary. The HD6200 will use the single frame filter selected on the Film Filters menu (Sharp, Normal, Anti-Alias or Safe) for non-orphan fields. If the Sharp, Normal or Anti-Alias filter is selected then it will use a single field filter if it has to process an orphan field. If the Safe aperture is selected this will be used at all times as it is tolerant of both video and film. The Adaption setting (see Film to Film above) can also be used if the film sequence detector is active.

3:2 to SF
This mode is used to convert 3:2 film material to SF. It is useful for converting 59.94Hz with 3:2 sequence to 23.98/24Hz SF. In this mode special care is taken to ensure the integrity of the outgoing SF sequence with respect to the incoming 3:2.

The output is guaranteed to have perfect SF sequence but this may require the repeating or dropping of input frames if the input and output are not locked together or the input sequence is broken. The Adaption setting can be used to provide improved performance around scene changes if the sequence detector is in use.

In this mode the HD6200 will automatically adapt the filter in the same way that it does for SF to 3:2 mode (see above).

SF to 1:1
This mode is used to convert incoming SF material to a progressive type output. This mode is targeted at producing the low frame rate progressive output standards. For example, it could be used to convert 24Hz SF to 1080/24P etc. The HD6200 takes special care to try and use all incoming frames when generating the output.

In this mode the HD6200 will automatically adapt the filter in the same way that it does for SF to 3:2 mode (see above).

3:2 to 1:1
This mode is used to convert incoming 3:2 material to a progressive type output. This mode is targeted at producing the low frame rate progressive output standards. For example, it could be used to convert 1080I 59.94 with 3:2 motion to 1080/23.98P etc. The HD6200 takes special care to try and use all incoming frames when generating the output.

In this mode the HD6200 will automatically adapt the filter in the same way that it does for SF to 3:2 mode (see above).

Film to SF
This mode is designed to take in film material with non-perfect SF sequence and convert it to perfect SF sequence. The output is guaranteed to be perfect SF. Its primary use will be to process material that has good SF sequence that has been disrupted at edit points. It is NOT designed to take in material that has been played off speed (Varispeed) and correct the sequence. Varispeed material may give disappointing results due to the need to do a large number of frame repeats or drops. This can produce a poor motion profile.

This mode can also be used to generate SF style output standards that are guaranteed to have complete SF frames. If the incoming material has perfect sequence and an SF output standard is desired, this mode will give good results.

In this mode the HD6200 will automatically adapt the filter in the same way that it does for film to film mode (see above).

Film to 3:2
This mode is designed to take in film material with non-perfect 3:2 sequence and convert it to perfect 3:2 sequence. The output is guaranteed to be perfect 3:2. Its primary use will be to process material that has good 3:2 sequence that has been disrupted at edit points. It is NOT designed to take in material that has been played off speed (Varispeed) and correct the sequence. Varispeed material may give disappointing results due to the need to do a large number of frame repeats or drops. This can produce a poor motion profile.

In this mode the HD6200 will automatically adapt the filter in the same way that it does for film to film mode (see above).

1:1 to 3:2
This mode is designed to take in low frame rate progressive inputs (e.g. 1080I /24P) and convert it to have 3:2 sequence (e.g. 1080I/60). The output is guaranteed to be perfect 3:2.

In this mode the HD6200 will automatically adapt the filter in the same way that it does for film to film mode (see above).

Film Mode Apertures

A number of different filters may be selected when the HD6200 is in a film processing mode. The selection is done on the *Convert-Film Ap-Aperture* menu page.

Sharp
The Sharp aperture can potentially produce the highest resolution pictures that can be obtained. This can give very good results with high-resolution film and graphics material. The price that is paid for this high resolution is that it is very intolerant of any film sequence detection errors. If the HD6200 is provided with incorrect sequence information or, its internal sequence detector makes an error, the artefacts can be quite visible. Sequence errors cause a high vertical frequency tearing of the picture on moving objects (variously known as Tearing, Venetian Blinding, Mouse Teeth etc). This is a very distinctive artefact. Because this aperture has been designed for use on film material it gives excellent performance, especially on material that would be difficult to convert if it had a video motion profile. For example, very sharp vertical edges and regions of high vertical detail such as window blinds. It will also give very good results on captions whether stationary or moving - provided of course, they have a film motion profile. This aperture would normally be too sharp for down-conversion modes. e.g. 1080I to 525/59.94. However, if the material is to be subsequently up-converted, this aperture is very useful as it allows the maximum amount of information to be retained in the down-converted image.

Normal
The Normal filter is similar to the Sharp filter (see above) but, offers slightly reduced vertical resolution when compared to the Sharp aperture. This means that it can offer all the advantages of the Sharp filter (good performance in areas of vertical detail etc) but, the visibility of sequence detection errors is very much reduced. Although it will theoretically provide reduced vertical resolution, in practice this is not normally the case. Most programme material is not vertically sharp enough to exploit the full potential of the Sharp filter due to the excessive twitter that can be produced if the source is viewed directly on an interlaced display. This means that the Normal filter is a good choice for the vast majority of film material if there is any uncertainty about the film sequence. This aperture will often be too sharp for down-conversion modes.

Anti-Alias
The Anti-Alias filter is similar to the Normal filter (see above) but, offers reduced vertical resolution when compared to the Normal aperture. This means that it can offer all the advantages of the Normal filter but, the visibility of sequence detection errors is even further reduced. This aperture will still be sharp enough for the majority of conversions. In addition, it is normally the aperture of choice for film down-conversion.

Safe
The Safe filter is slightly different to the Sharp, Normal and Anti-Alias filters. It is Safe in the sense that even in the presence of sequence detection errors it will never exhibit the tearing effect described above. It is also tolerant of video material so that it can be used to process any type of programme. The downside of this is that it cannot give such good performance as the dedicated film apertures in areas of high vertical detail.

Other Options

Blur
The amount of Blur produced when a video input is being processed can be controlled from the Convert-Vid Ap-Blur menu. This will be the case when the unit is in Video to Video, Video to SF or Video to 3:2 mode. If the Auto setting is selected then the good results will usually be obtained. However certain Video to SF and Video to 3:2 conversions can benefit from having the Blur setting increased. In addition, conversion from 59.94Hz inputs to (true) 24P outputs can produce more blur than is required with the Auto setting. In this case the Blur setting can be used to reduce the amount of output Blur.

It is recommended that the CUT detector (see below) is turned ON if the Blur setting is set to Medium or High. This prevents excessive interpolation across scene changes

Adaption
Film Adaption can be turned on and off using the *Convert-Film Ap-Adaption* menu page. If the Film Adaption setting is turned on then the HD6200 will adapt the film conversion aperture to match the incoming material if the sequence detector is turned on. This allows mixed film and video to be put through the HD6200 with film material using a film aperture and video material using a video aperture. If adaption is turned off the video material would be processed with a single field aperture which can produce soft output fields. Adaption is also undertaken around scene changes to provide protection against undetected orphan fields in the edit point regions, which could otherwise cause picture tearing.

Cut Detector
The HD6200 includes a Video mode Cut detector which can be turned on and off using the *Convert-Vid Ctl-Vid Cuts* menu entry. This is used in the video input modes to detect scene changes as they come in. It steers the video interpolation aperture such that it does not go across the cut or scene change. As noted above, it is recommended that this is turned on when doing video conversions and the Blur setting has been increased (see section Video to SF above)

Film Sequence Detection

The Hd6200 can derive film sequence information from a variety of sources. This section describes these sources and how to set them up. These choices can be found on *the Convert-Film Ctl-Flag Src* menu. The following text is concerned with the film sequence of the incoming program material alone. It is not concerned with the output film sequence from the HD6200.

Auto

In this mode the HD6200 will use INTERNAL mode (see below) if the input video is an SF format. Otherwise it will use DETECT mode (see below).

Free Run

In this mode the HD6200 uses an internal free running film sequence generator. This method is only suitable for program material with continuous film sequence. If the program is stopped or paused then it may be necessary to re-phase the sequence generator once the program has been restarted.

This mode may require two further settings to be made.

Firstly, the free running sequence can be either 2:2 or 3:2. The type is determined by the *Convert-Film Ctl-Free Run-Type* menu setting. If the type has been set to Auto then the HD6200 will decide the free run type by examining the input video standard. The algorithm is, if it's an SF format then it is 2:2. If its progressive and the frame rate is greater than 48 it's 3:2. If it's interlaced and the frame rate is greater than 25fps it is 3:2. The user can also force the free run type to be 2:2 or 3:2 as required.

Secondly, the phase of free running sequence generator will need to be adjusted to match the incoming video. This is done using the *Convert-Film Ctl-Flag Delay* menu setting.

Detect

In this mode the HD6200 uses an internal film sequence detection system. This can be used with any arbitrary incoming film or video sequence. There are a couple of points worth noting when using the internal sequence detector.

Firstly, it is worthwhile checking the position of the sequence detection window if the edges of the picture are incorrect or if the input picture is letterboxed. The top and bottom of the picture can be disrupted by head switching artefacts and the like. This can cause the detector to produce extra orphan fields. Making sure that the sequence window only contains good active video gives it the best chance of success. The window position can be adjusted from the *Convert-Film Ctl-Detector-Window-Position* menu.

Secondly, it is possible to adjust the bias of the film sequence detector. This should not normally be necessary. However, on difficult material it can be used to steer the detector towards the correct answer. If the bias is adjusted towards video it is more likely to detect orphan fields. If the bias is adjusted away from video and towards film it is less likely to generate orphan fields and more likely to generate repeat fields. This can be particularly useful on Varispeed material. If the playback speed is high then the detector can be adjusted towards video to help find any orphan fields. If the playback speed is low then the detector can be adjusted towards film to help find any extra repeat fields. The bias is adjusted using the *Convert-Film Ctl-Detector-Bias* menu.

Internal

In this mode the HD6200 uses an internal 2:2 film sequence generator. Incoming field ones are treated as the first field of the film frame and input field twos are treated as the second field of the film frame. If the input dominance is reversed the internal sequence may be inverted using the Convert-Film Ctl-Invert button. This is most often useful for SF format inputs, which should have strictly maintained normal dominance.

External

In this mode the HD6200 uses an external TTL pulse from the 3:2 Flag In BNC connector on the rear panel. This can be driven by a Telecine pulldown output to indicate the incoming film sequence. The meaning, sense and delay of the input pulse are set using the Convert-Film Ctl-External sub-menu settings. This allows the specification of arbitrary film sequences. The pulse can indicate either the presence of a new film frame or, the presence of a repeat field (e.g. the third field of a 3:2 sequence B frame). There is a separate delay setting for the external pulse which allows the user to align the pulse with the video at the input of the HD6200. The pulse can be specified as active high or active low.

Timecode (Trig)

In this mode the HD6200 uses the internal free running 2:2 or 3:2 sequence generator as described in Free Run mode above. However, the phase of the free running sequence generator is reset by the timecode on the incoming video. The input timecode value that causes the free run generator to be reset is set on the Utils-Timecode-Trigger menu. The phase of the free run generator at the reset point is set using the Convert-Film Ctl-Flag Delay menu setting.

This method is suitable for program material with continuous film sequence. If the program is stopped or paused then it is not necessary to re-phase the sequence generator once the program has been restarted provided, the timecode trigger value is once again passed. This allows the user to preview material any number of times without having to reset the free running sequence generator phase.

Timecode (0 & 5)

In this mode the HD6200 uses the internal free running sequence generator. The free run generator is reset whenever the input video timecode has a frame count of zero or 5. This is useful when the incoming 3:2 sequence has a timecode locked sequence. Note that this method can only work if the incoming timecode is non-drop frame. Also, the phase of the free run generator at the 0 and 5 frame counts is set by the *Convert-Film Ctl-Flag Delay* menu setting.

This method is suitable for program material with continuous film sequence. If the program is stopped or paused then it is not necessary to reset the free running sequence generator phase as it will be reset at the following 0 or 5 frame timecode count.

Remote

In this mode the HD6200 uses a combination of the internal free running sequence generator and the RS-422 remote control port as the source of film sequence information. The film sequence information can be sent every field using the RS-422 connection so that arbitrary film sequences can be identified. Alternatively, the remote controller can send occasional film sequence phase commands when the sequence changes and the HD6200 input film sequence will free run in between them with the last defined phase. The Free Run type (2:2 or 3:2) is determined by the *Convert-Film Ctl-Free Run-Type* menu setting. Note that in this mode the Free Run Flag Delay menu setting has no effect as the phase of the film sequence is determined solely by the incoming RS 422 commands.

Film Sequence Detection Problems

When the HD6200 is doing Film processing there are a number of pitfalls waiting for the unwary. These can cause sequence detection failure and problems with the conversion. Some of them are noted here.

Captions

It is quite commonplace for electronic captions to be placed over film material. This is fine if the captions are stationary, however if the captions are moving then this can cause problems if the caption motion is not synchronised with the underlying film material motion profile. For example, if captions are scrolling and they move every field (i.e. they are video captions) then this can cause two problems. Firstly, if the internal film sequence detector is in use it may think that the material is video and change to a video mode. This could involve continuous use of a single field filter and this can give problems in areas of vertical detail. Secondly, it may not ‘see’ the captions and it will continue to extract the underlying film sequence. This will cause the caption area of the signal to be distorted by the film filters. This will also happen if an external source of film sequence is applied which signals the underlying film sequence rather than the video captions. The exact behaviour of the internal film sequence detector will depend upon the relative amounts of detail in the captions and the film and the amount of motion and so it is very material dependant. Using the Normal or Anti-Alias rather than the Sharp film aperture will help reduce the visibility of picture disturbance as will the use of the Safe aperture. Depending on the output standard in use, it may be necessary to put the HD6200 into Video to SF mode, Video to 3:2 mode, Film to SF or Film to 3:2 mode to convert the captions to a film style motion profile even though the underlying material is already film.

Video effects

If film material is processed using electronic video effects then this can effectively convert the film material into video. This is commonly seen when the film material is electronically faded. The fade level changes every field to give a smooth effect. Unfortunately this means that to the HD6200 the scene changes every field which it interprets as video. If the unit is operating in a film mode this can cause continuous use of a single field filter, tearing of the scene or disrupted output sequence. To avoid these problems the unit must be put into one of the safe modes (e.g. by using the Safe aperture) or, the incoming material must be treated as video and converted to film for the duration of the effect. If the internal sequence detector is being used, the HD6200 is in a film mode and Adaption is turned on, then, it should be reasonably tolerant of this kind of effect, as it will adapt the filters appropriately. If strictly correct output film sequence is required then the Film to 3:2 or Film to SF modes may be required. In this case the HD6200 may be forced to drop or repeat frames from the underlying film as the 'true' film sequence is masked by the video fade. The same problems occur when there is a fade between two film segments that have different film sequence phases.

Varispeed Playback

Off-speed playback can cause some problems with field sequence detection. The problems usually occur when the slow down or speed-up is done by shifting material up and down to simulate material with the opposite sense of interlace. For example, to slow down some 3:2 material it may be necessary to generate an extra field two. One way of doing this is to take the preceding field one and shift it vertically. This won’t be very visible to the eye during playback. Unfortunately, if the scene contains a reasonable amount of vertical detail the film sequence detector will ‘see’ the picture shift and it will think that it represents a change in camera position say. This produces an orphan field instead of the extra repeat field. This shouldn’t be very visible at the converter output, as it will just produce an isolated field built with (say) the single field filter but, it won’t cause any tearing effects. The sequence detector bias can be adjusted to compensate for this (see above).

In addition, if the HD6200 is doing a conversion like Film to SF or Film to 3:2 then, Varispeed will often require a large number of dropped or repeated film frames. This can give the output an undesirable motion profile which results in jerky object movement. The dropped or repeated frames are inevitable, as the HD6200 has to produce output frames at a constant rate in real time.

Artificial Motion Profiles

Another common effect is changing the timeline of a piece of material by dropping or inserting frames or fields. This is not normally a problem however it can cause problems if the object motion from field to field is inconsistent. For example, if an object is moving with a fairly steady and reasonably large motion then, for one field it moves a much smaller amount before resuming the large movements then this can cause the motion to be misinterpreted as a repeat field rather than an orphan.

Input and Output Field Rates

It is worthwhile considering carefully the input and output field rates before undertaking a conversion. This is particularly true for the one part in a thousand field rate difference associated with 59.95 and 60Hz (and also of course with 23.98 and 24Hz). Every time the input and output syncs run though a frame, the HD6200 must drop or repeat a field or frame to compensate. A field repeat or drop is much less visible than a frame drop. Field repeats or drops tend be used in video modes whereas film modes tend to use frame drops. This means that the run through can be much more apparent in film modes.

So, if the input field rate is 59.94Hz it is much better to convert to output frame rates of 59.94, 47.95 or 23.98 rather than 60,48 or 24Hz. Similarly, if the input is 24Hz the ideal output frame rate would be 24, 48 or 60Hz. Also, the input and output sync trains should be locked together. This is very easily achieved with the HD6200 if the unit is locked to the input signal. This can also be achieved with the use of common reference signals.

Output Film Sequence

When the HD6200 is converting to SF or 3:2 output formats then it uses an internal output film sequence generator to produce the output film sequence.

When the output format is SF there is no need to control the output film sequence, as it is always Normal dominance. i.e. an output frame is made of a field one and the following field two.

When the conversion produces a 3:2 style output then the phase of the 3:2 may need to be linked to the timecode inserted at the output of the HD6200. For example, if may be desirable to have an A-Frame at the on-the-hour timecode value. The HD6200 can do this and, the methodology is described in another HD6200 Application Note - "HD6200 Timecode Operation"

Application Note - The HD6200 Timecode Modes

The HD6200 can use a number of different methods for the insertion of timecode. This document contains notes concerning the operation of the various timecode modes and options and, how to link the timecode operations to output film sequence. These notes relate to HD6200 software version A3_0_000 and onwards (released in July 2002).

Operating Concepts

The HD6200 has the ability to monitor its input video timecode and act upon it in a variety of user selectable ways to change the output timecode that it inserts. In addition, when it is doing certain film conversions it can lock the HD6200 output film sequence to the timecode that it is inserting. The combination of these two factors provides very powerful video processing ability. For example, it is possible to specify that a given input frame will produce an output frame with a specified 3:2 sequence phase and timecode and that the HD6200 will output "perfect" 3:2 sequence. This is a very useful technique for 3:2 re-mastering.

The HD6200 timecode insertion is principally based upon two timecode concepts. The first of these is the Timecode Trigger and the second is the Timecode Preload.

The Timecode trigger is simply the value of input video (source) timecode that will cause an output timecode event to occur. In other words, when the input video timecode equals the trigger value, the HD6200 will modify the timecode it inserts according to the user specified timecode synchronisation mode. If the input timecode is drop frame then it is essential to ensure that the Trigger value entered is a **legal drop frame value**. If a value is entered that cannot occur in drop frame timecode then a Trigger will not happen. The timecode Trigger value is entered on the HD6200 Utils-Timecode-Trigger menu page.

The Timecode Preload is the value of output timecode to be inserted on the video frame that the HD6200 generated from the input video frame with the Trigger timecode value. Note that in doing this the HD6200 automatically compensates for it's internal processing delay. If the output timecode is drop frame then it is essential to ensure that the Preload value entered is a **legal drop frame value**. If a value is entered that cannot occur in drop frame timecode then the HD6200 output timecode will not be standard drop frame timecode and this could cause problems with downstream equipment. The timecode Trigger value is entered on the HD6200 Utils-Timecode-Manual menu page.

The Timecode Synchronising Modes

The timecode synchronising mode is selected from the *Utils-Timecode-Config-Sync* menu page. The HD6200 has the following timecode synchronising modes available:-

Manual Mode

In this mode, the timecode trigger value is not used. The timecode can be set to all zeroes at any point by pressing the Zero button. Alternatively, the output timecode can be set to the Preload value at any time by pressing the Preload button. The output timecode is not affected by the input timecode. The Zero and Preload buttons are located on the *Utils-Timecode-Manual* menu.

Zero Mode

In this mode, when the input video timecode is equal to the timecode trigger value, the output timecode is set to be all zeroes (zero hours, zero minutes, zero seconds and zero frames). This is illustrated in Figure 1. In this example the trigger timecode has been set to the one-hour point (01:00:00:00). When the HD6200 produces an output video frame from the input frame that had timecode 01:00:00:00 this frame will be stamped with the all zeroes timecode (00:00:00:00) and the inserted timecode will free run from there onwards. This mode can be used even when the HD6200 is standards converting because, the output timecode generator free runs after it has been reset by the input video timecode.

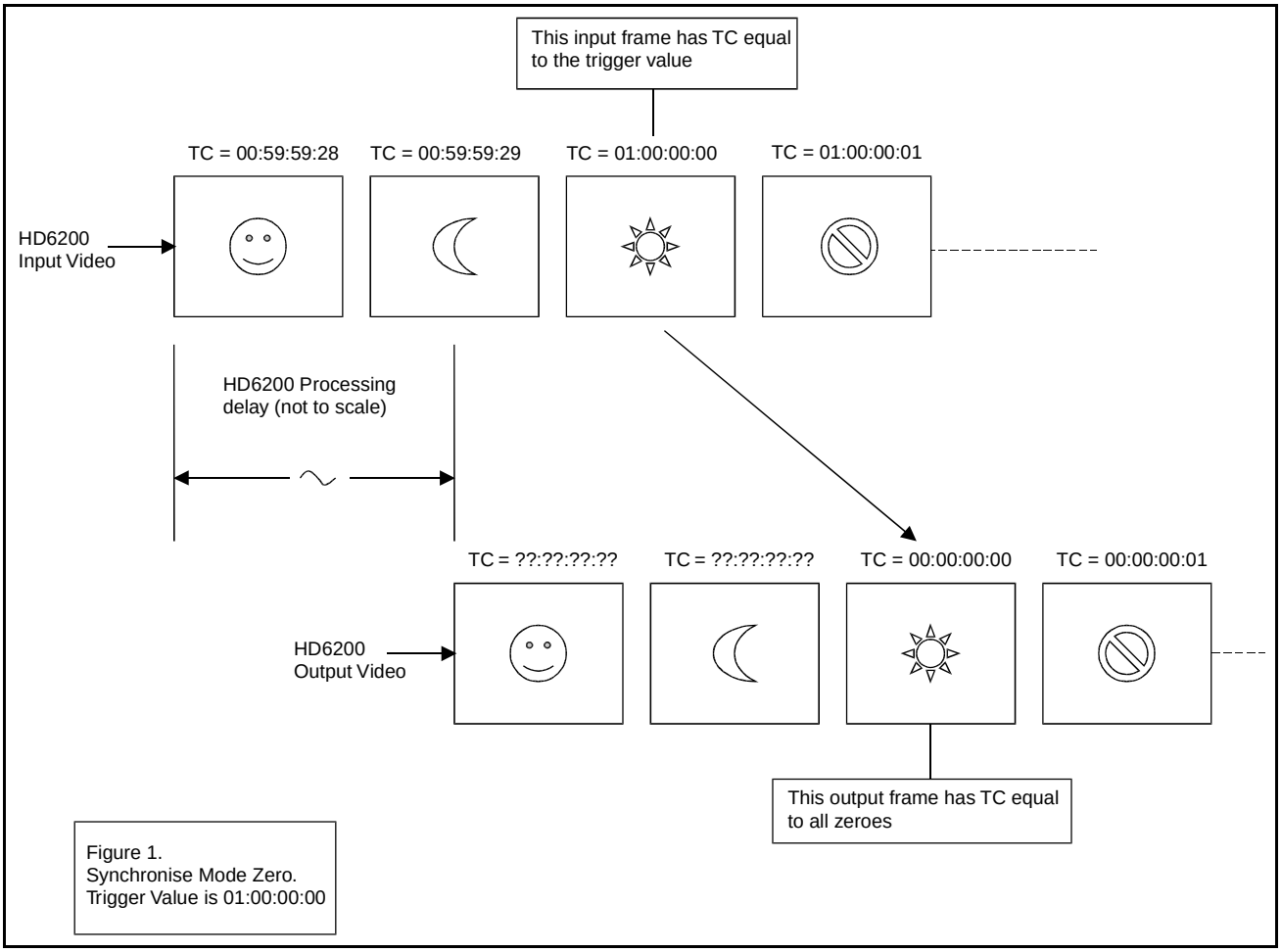


Figure 1.
Synchronise Mode Zero.
Trigger Value is 01:00:00:00

Preload Mode

In this mode, when the input video timecode is equal to the timecode trigger value, the output timecode is set to the user entered Preload value. This is illustrated in Figure 2. In this example the trigger timecode has been set to the one hour point (01:00:00:00) and the Preload value has been set to 04:05:06:07. When the HD6200 produces an output video frame from the input frame that had timecode 01:00:00:00 this frame will be stamped with the Preload timecode (04:05:06:07) and the inserted timecode will free run from there onwards. Once again this mode can be used even when the HD6200 is standards converting because, the output timecode generator free runs after it has been reset by the input video timecode.

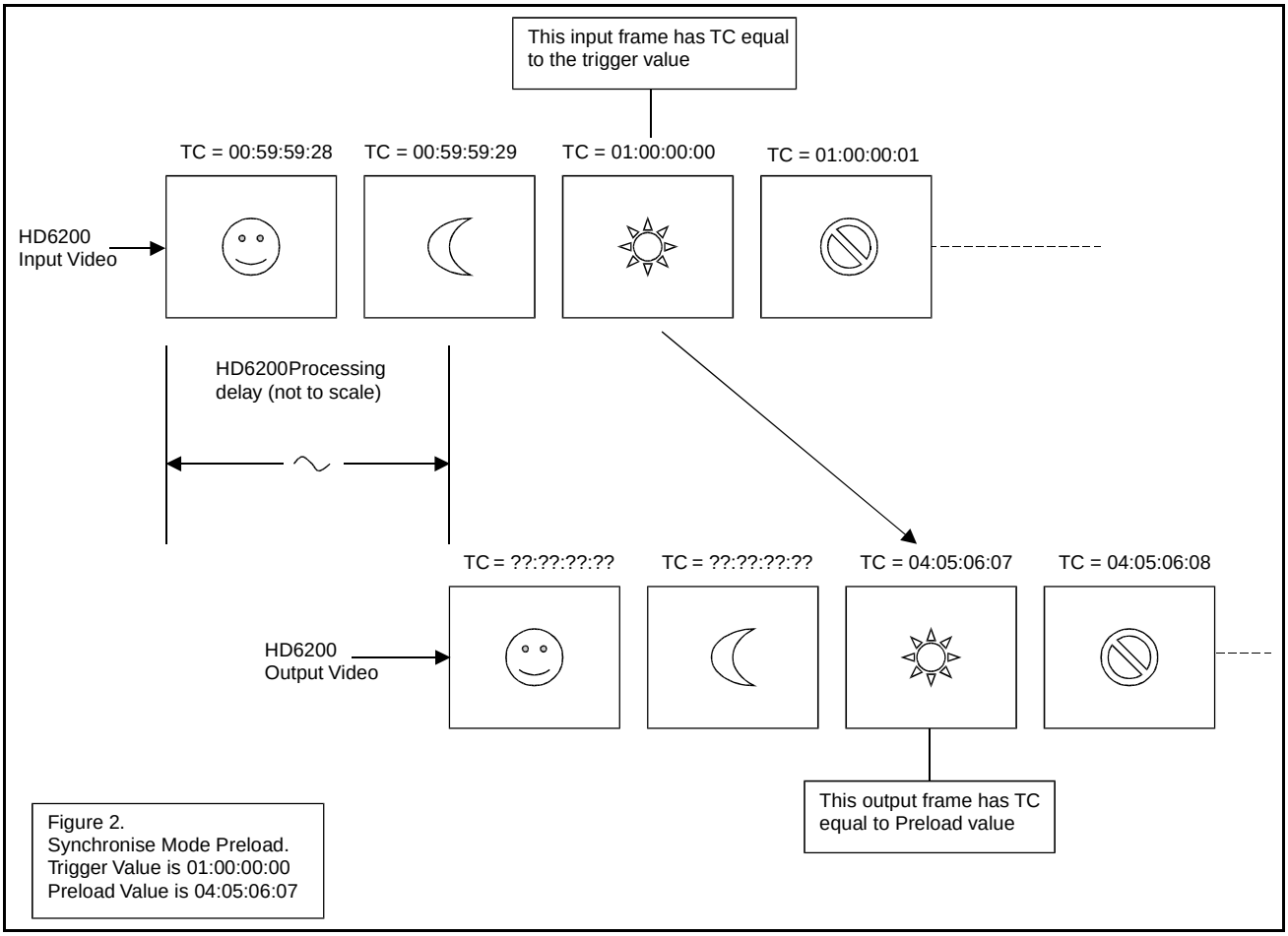


Figure 2.
Synchronise Mode Preload.
Trigger Value is 01:00:00:00
Preload Value is 04:05:06:07

Synchro Mode

Synchro mode is an enhanced version of Preload mode. A common requirement is to have a synchronised timecode point, that is, where a given input timecode produces a specified output timecode and, in addition, to have continuous output timecode for some period prior to the synchronisation point.

For example, suppose that we have some input program material that has it's first frame at timecode 01:00:00:00 and we require the HD6200 to make the first output program frame with timecode 02:00:00:00. In addition the input program material has a particular test pattern for about 30 seconds prior to the first program frame and, it is desired to transfer the test pattern to the HD6200 with continuous timecode through both the test pattern data and the program material

This could be achieved using Preload mode as described above. However, the user would have to calculate the Trigger and Preload points by working backwards from the synchronisation point. This can be a very difficult calculation if the input or output timecode is drop frame and/or the HD6200 is doing frame rate conversion.

In Synchro mode the HD6200 will perform this calculation itself. The user enters the desired synchronisation point just as in Preload mode. Thus in our example the trigger would be set to 01:00:00:00 and the Preload is set to 02:00:00:00. The program material to the HD6200 is then started. Once a stable input to the HD6200 is available the User can press the Synchro button. Once this has been done the HD6200 will perform the required timecode calculations. A few seconds after the Synchro button has been pressed, the HD6200 output timecode will reset to a new value and will free run from that point. When the input timecode reaches the Trigger value the output timecode will have the Preload value as desired.

The operation of Synchro mode is shown in Figure 3.

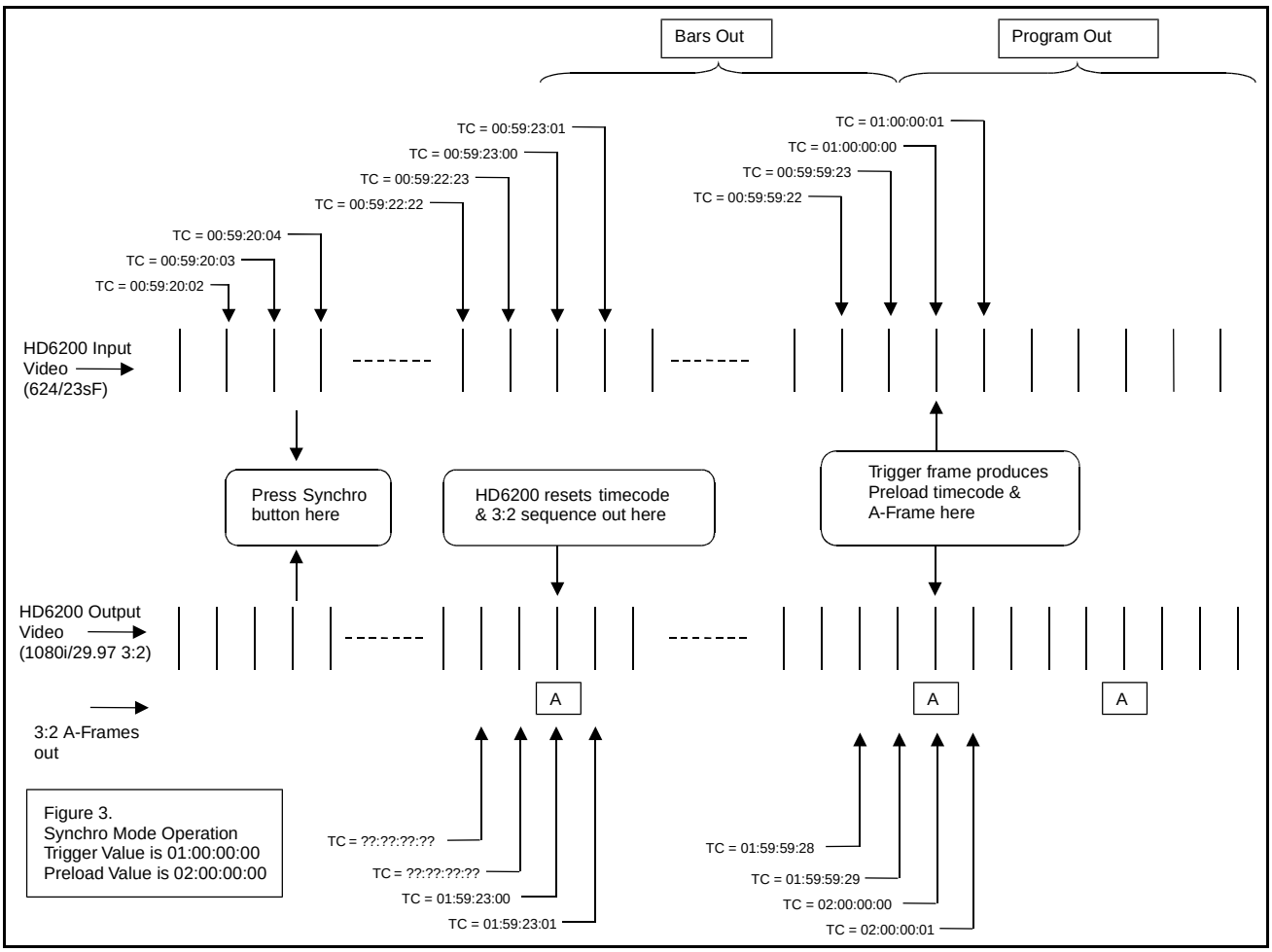


Figure 3.
Synchro Mode Operation
Trigger Value is 01:00:00:00
Preload Value is 02:00:00:00

Note there are some precautions that must be taken if Synchro mode is to be used reliably.

1. The timecode calculations have to assume that the input and output of the HD6200 are locked together. This does not mean that they have to be the same frame rate but it does mean that either the HD6200 is genlocked to it's input video or, the video source and the HD6200 are locked to a common reference. Thus, 1080i/29.97 can be converted to 1080sF/23.98 with no problem provided the genlock conditions are met. This means that the HD6200 must be locked to it's reference **before** the Synchro button is pushed.

2. Synchro mode does **not** allow for conversions that have a one part in a thousand frame rate difference. For example, 1080i/29.97 to 1080sF/24 will not give reliable results even if the genlock constraints are met. The timecode calculations cannot allow for the relative sync positions at the time the Synchro button is pushed and so, cannot provide a reliable result in these circumstances.

3. In Synchro mode the output timecode generator free runs once the Synchro reset has been done. Thus, the input video must have **continuous timecode** and must be played in at **normal speed** for successful synchronisation to occur. If for example the input is paused and then restarted it will be necessary to push the Synchro button again once the input is running at normal speed. The Synchro button can be pushed more than once without problem.

4. Because of the time taken to perform the timecode calculations and the need to calculate a Trigger point in advance of the current input timecode there is a minimum time before the synchronisation point that the Synchro button must be pressed. The minimum time varies with input and output frame rates but use of a minimum time of around ten seconds will always work. If insufficient continuous timecode before the synchronisation point is available for successful Synchro operation Preload mode should be used with the Trigger and Preload values set before the synchronisation point. The delay between pressing the Synchro button and the output timecode changing is not fixed and will vary with the input and output standards and the input timecode present at the moment the button is pressed.

5. If a slow PAL (625/23sF or 625/24sF) signal is being used as either the input or output standard then it is essential to ensure that the HD6200 slow PAL timecode maximum frame count is set to the correct value or the timecode calculations will not be correct. The HD6200 can handle slow PAL timecode that counts either from 0 to 23 frames or, 0 to 24 frames.

6. The input timecode drop frame flag embedded in the incoming timecode is read and used in the timecode calculations. It is essential that this flag is set correctly.

Note the Synchro button is located on the *Utils-Timecode-Manual* menu page. The button is disabled if the timecode synchronisation mode has not been set to Synchro.

Echo Mode

In this mode, when the input video timecode is equal to the timecode Trigger the output timecode is set to the Trigger value. This is equivalent to Preload mode with the Trigger and Preload set to the same value. If either the input **or** output timecode are drop frame then the Trigger value must be a legal drop frame value. If the HD6200 is frame rate converting then it is possible that the Trigger timecode could be an illegal output timecode value. For example, if the HD6200 is converting from 1080i/29.97 to 1080sF/23.97 the input timecode frame count goes from 0 to 29 whilst the output timecode goes from 0 to 23. Thus if the Trigger timecode frame count is set to more than 23 this will be an illegal output timecode but a legal input timecode. In this case the output timecode frame count load value is clipped to the maximum legal value (23 in the example).

E-E Mode

In E-E mode the input timecode is fed through to the output video. This mode guarantees to keep the hours, minutes and seconds of the output timecode the same as the input timecode. However, in general, the input and output frame counts are not guaranteed to match. This mode is very useful for generating outputs where the output timecode is approximately the same as the input at all times. This works even when the input timecode is discontinuous.

Combining Timecode with 3:2 Film Sequence Output

We have already seen that the HD6200 can be set-up such that a given input frame can be used to make an output frame with a specified timecode. Taking this a step further, if the HD6200 is using it's internal 3:2 sequence generator to output "perfect" 3:2 sequence then, we can also link the 3:2 sequence phase to the output timecode. This enables us to say that a given input frame will produce an output frame with a specified timecode and, a particular 3:2 phase. The HD6200 internal 3:2 sequence generator will be used whenever the HD6200 is in Video to 3:2, Film to 3:2, sF to 3:2 or 1:1 to 3:2 conversion modes.

Note that the internal 3:2 sequence generator reset must be enabled from the *Convert-Film Ctl-Free Run-3:2 Reset* menu entry. The default for this setting is disabled. The menu item next to this *(Convert-Film Ctl-Free Run-Reset Frm)* controls the reset phase of the 3:2 generator when a reset is requested. The 3:2 sequence can be reset to either an A-Frame or a B-Frame. C and D-Frames are not available as reset phases. This is because it is illegal to change the timecode frame count between a field one and a field two. Thus, if the 3:2 sequence was reset to a C or D frame (which begin on a field two), either the timecode would not match the film sequence as desired or, illegal timecode would be generated.

If the 3:2 sequence reset has been enabled, the internal 3:2 sequence can be reset whenever the HD6200 has been put in a timecode synchronising mode that uses the timecode Trigger value. So, the reset will occur in Zero, Preload, Synchro and Echo modes. The reset will **not** happen it Manual or E-E modes, which do not use the timecode trigger value. The 3:2 sequence reset occurs on the same output frame that the timecode reset is undertaken.

For example, suppose that we have 625/23sf input and we wish to convert it to a 1080i/29.97 output by inserting 3:2 sequence into the input 2:2 stream. We also wish to have the input frame with timecode 01:00:00:00 emerge from the HD6200 with timecode 02:00:00:00 and, we wish this frame to be an A-Frame. Finally, there is about 30 seconds of Bars before the start of program on the source tape and we wish to transfer these to the output yet have continuous timecode through the Bars and synchronise point.

The set-up steps required for this example are shown in
below. The first column shows the function being set-up. The second column shows the setting that is picked for the example conversion. The third column shows the HD6200 menu where that setting can be made. Note that the Table probably shows more set-up steps than would be required in practise. Many of the factory default values will actually be correct.

The set-up operation has selected timecode Synchro mode so that we can have continuous timecode before the synchronisation point. Once the set-up is complete the simple steps shown in
can be followed to do the actual conversion.

The combination of Timecode Synchro and 3:2 sequence resetting is shown in Figure 3.

Notes On Setting Trigger Points with Film Inputs

If the HD6200 is being used with film inputs and timecode trigger points are being set, then it is advisable not to set the Trigger point on Orphan fields. This is because the HD6200 will often be able to discard Orphan fields at it's output in order to avoid the production of soft output frames. If this happens the Trigger frame will not appear in the output stream and the timecode trigger will happen on the input frame following the frame on which the Trigger was set. For added safety when using the HD6200 sequence detector it is usually best to set the trigger point on the first field of a film frame if possible. This provides added protection against sequence detection problems.

Table 1 -Setting the HD6200 for timecode synchronised 3:2 reset.

Function	Example setting	Menu Name
Apply the input video to the HD6200.	[625/23sF]	
Select the desired output standard	[1080i/29.97]	Output-standard
Enable genlock	[Enable]	Reference-Enable
Set the reference source	[Lock to input]	Reference-source
Select the required conversion mode	[sF to 3:2]	Convert-Mode
Select the source of film sequence information	[Internal]	Convert-Film Ctl-Flag Src
Turn on resetting of the 3:2 output sequence	[On]	Convert-Film Ctl-Free Run-3:2 Reset
Set the desired 3:2 reset phase	[A-Frame]	Convert-Film Ctl-Free Run-ResetFrm
Select the desired aperture	[Sharp]	Convert-Film Ap-Aperture
Turn on the timecode output	[Enable]	Utils-Timecode-Enable
Set the output timecode to drop frame	[Drop Frm]	Utils-Timecode-Config-Drop Frm
Set the input timecode to be VITC	[VITC]	Utils-Timecode-Config-SD-TC Source
Set the input VITC line number	[14]	Utils-Timecode-Config-SD-VITC In
Set the slow PAL timecode frame count	[23]	Utils-Timecode-Config-SD-Slow PAL
Set the timecode sync mode	[Synchro]	Utils-Timecode-Config-Sync
Set the input timecode trigger value	[01:00:00:00]	Utils-Timecode-Trigger
Set the output timecode preload value	[02:00:00:00]	Utils-Timecode-Manual

Table 2 - Making a conversion

Cue source VTR to start of Bars
Start source tape
Stable timecode from VTR, press the Synchro button
Once the HD6200 has reset its timecode and 3:2 sequence output, start recording the HD6200 output.

RollTrack Audio Delay Tracking

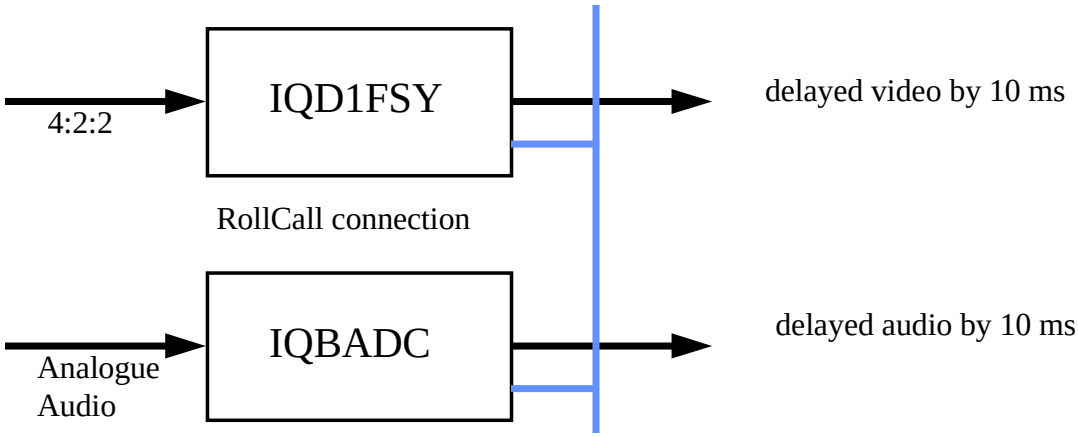
RollTrack is a feature of RollCall™ (Snell & Wilcox's proprietary remote control system), that allows devices to communicate across the RollCall network with no direct user intervention.

RollTrack Audio Delay Tracking enables Snell & Wilcox RollCall™ compatible audio delay products to track delay introduced by RollCall™ compatible video processing products.

The current products that implement RollTrack Audio Delay Tracking are:

Audio Delay Modules	Video Modules	Other Products	
IQBAAD	IQD1FSY	ALCHEMIST	MDD3000
IQBADC	IQDMSDS	CPP100	MDD550
IQBDAC	IQDAFS	CPP200	MDD560
IQBDAD	IQDMSDS	NRS500	MDD570
IQBSYN	IQDMSDP	HD5050	MDD2000
IQBADCD	IQDSYN		

The simplest configuration is a single video unit and a single audio delay in a RollCall™ system. The audio delay will have the same delay as through the video path. If the delay changes the audio delay will track.



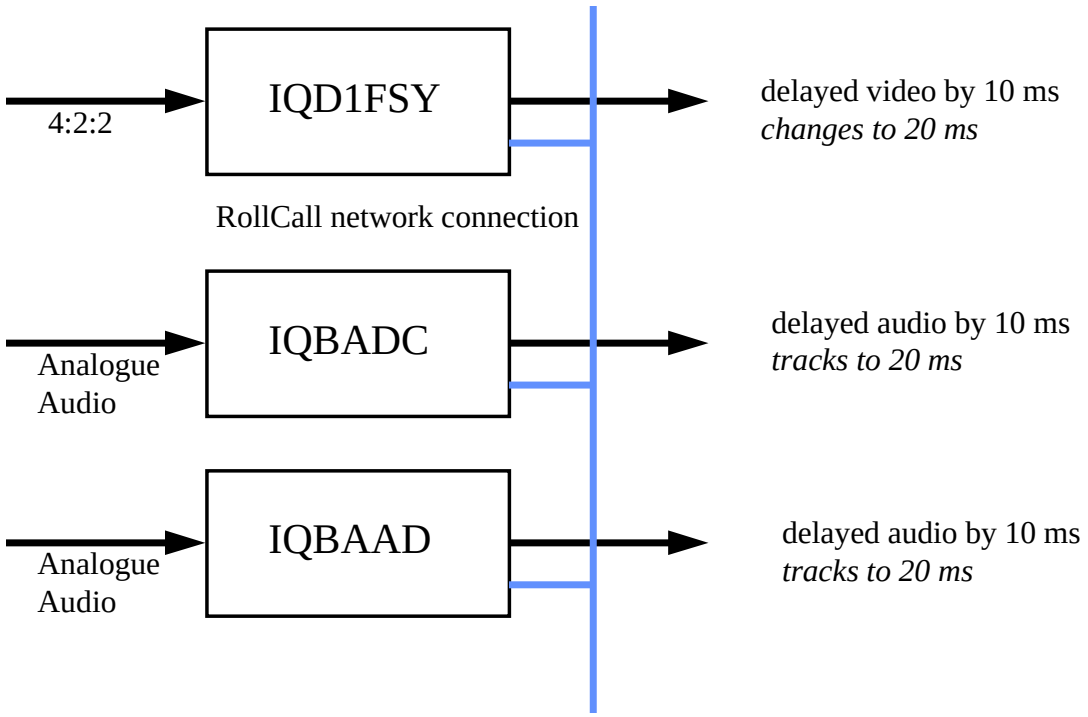
The next level of configuration is where there are multiple Frame Synchronizers (for example) each connected through RollCall™ to their own tracking Audio Delay. (It is worth stating that the synchronizers and audio delays do not have to be in the same enclosure; the addressing scheme, discussed later, allows for the units to be positioned anywhere in the RollCall™ domain.)

The maximum number of video units and audio delays in a RollCall™ system is set by the maximum limit of the number of modules in a RollCall™ network and is currently 3840 on a single network without bridges.

The unique identification of the destination unit (a decimal number) for various modules is as follows:

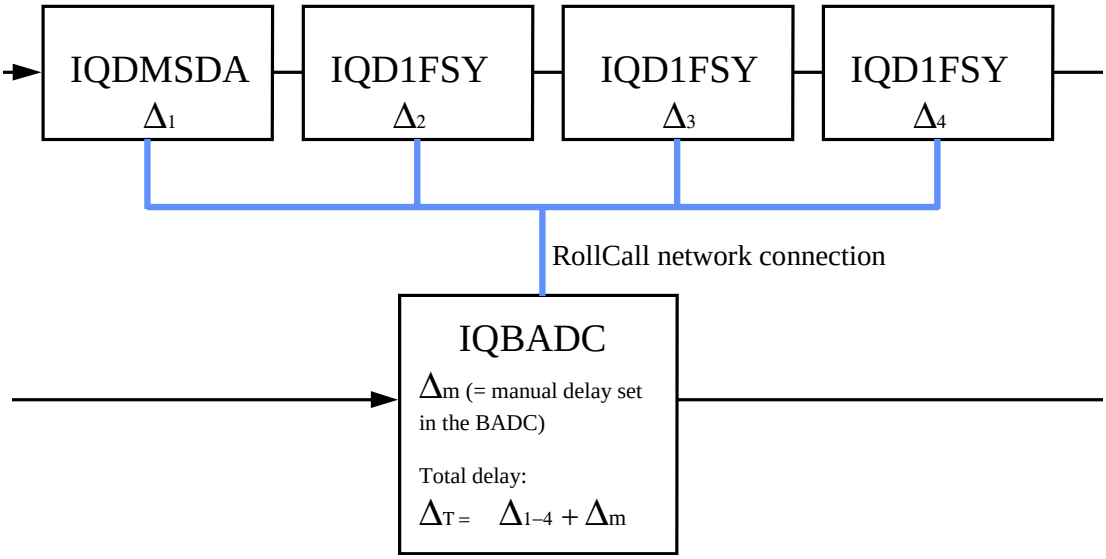
Module	ID
IQBADC	51
IQBDAC	52
IQBAAD	53
IQBDAD	54
IQBSYN	89
IQBADCD	107

The next level of complexity is *a vertical delay cluster* where a video unit can have up to eight audio delays tracking - of the same or different types.



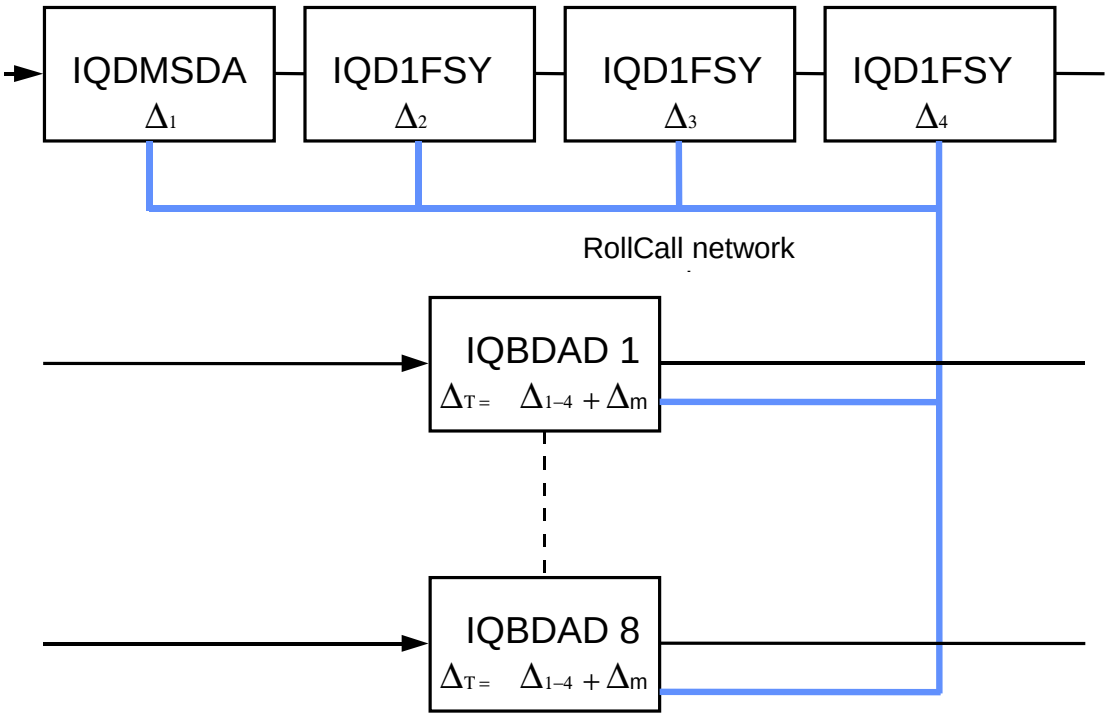
From one to eight audio delay products can be connected via RollCall™ to a single frame synchronizer, for example. If the synchronizer delay changes, then however many audio delays are connected will track the delay. The audio delays can also have a manual delay which will be added to the RollTrack delay.

The next level of complexity is *a horizontal delay cluster* where an audio delay can track up to four video units.



The total delay time through the audio delay is then the sum of the individual delays introduced by the video units plus the manual delay of the audio unit. The manual delay can be set to compensate for any fixed propagation delay in the video path or may be set to zero.

The next level of complexity is a *matrix delay cluster* where each audio delay (up to eight) can track up to four video units. This configuration is in effect a four by eight matrix of video units and audio delay units. The total delay time through the audio delay units is then the sum of the individual delays introduced by the video units plus the manual delay of the audio unit.



As any of the delay times change in the video path so will the audio delay time track this delay.
A virtual connection is made between from, say, an IQD1FSY to an IQBDAD by:

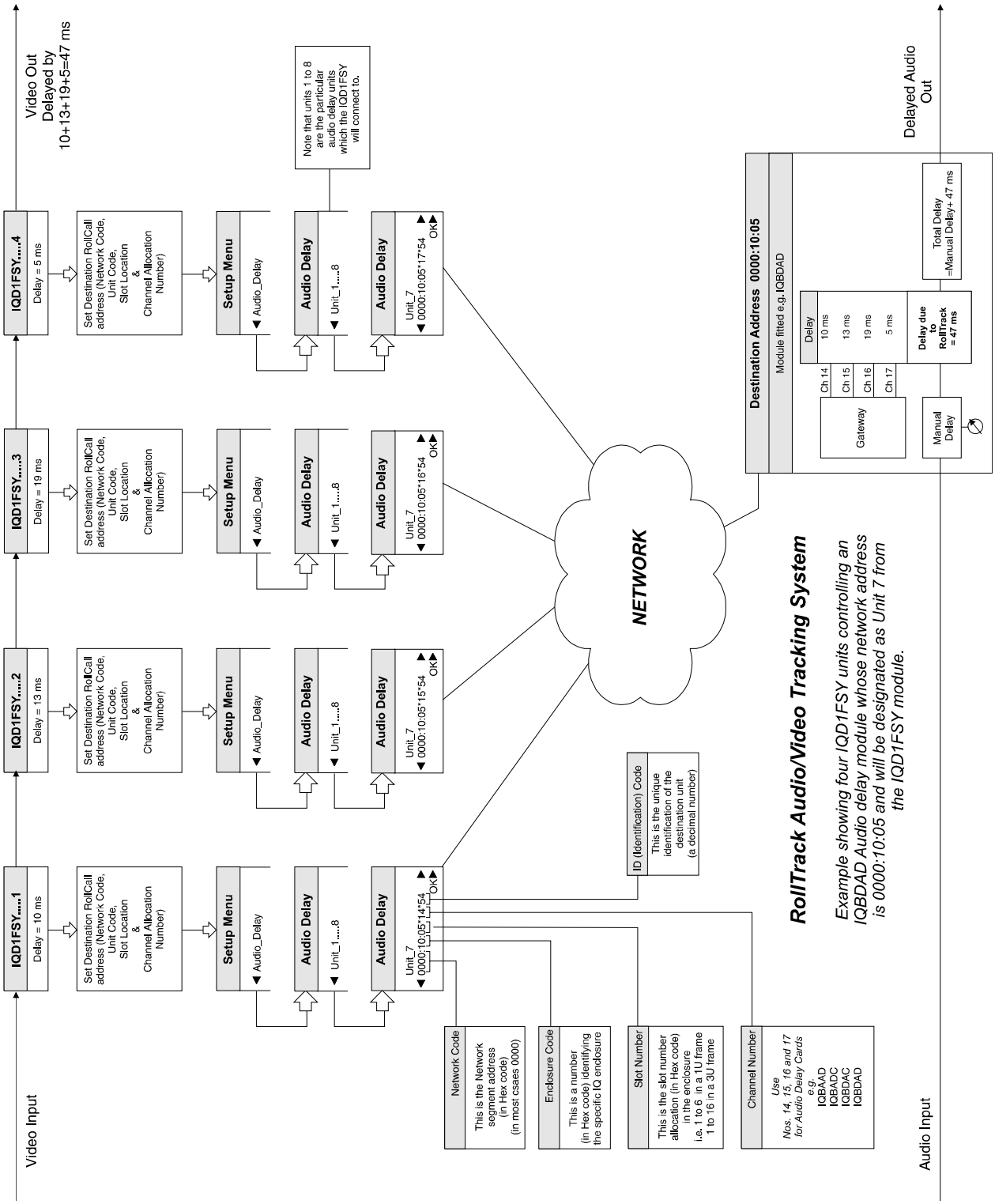
selecting the *Setup...* Menu of the IQD1FSY
then selecting the *Audio_Delay...* Menu
then choosing from *Unit_1* to *Unit_8*
then entering the unique network address of the IQBDAD in the form *nnnn:xx:yy*z*d*
where *nnnn* = network address and in most cases will be 0000(hex);
xx = IQ enclosure address (hex);
yy = slot address of the IQBDAD (hex)
z = the connection (or channel) number (decimal) - see table below.
d = the unique identification of the destination unit (decimal) The ID entered must match the **receiving units own ID or else the command will be ignored. If the ID value is set to 00, the receiving unit does not perform an ID match and will always accept the incoming command**

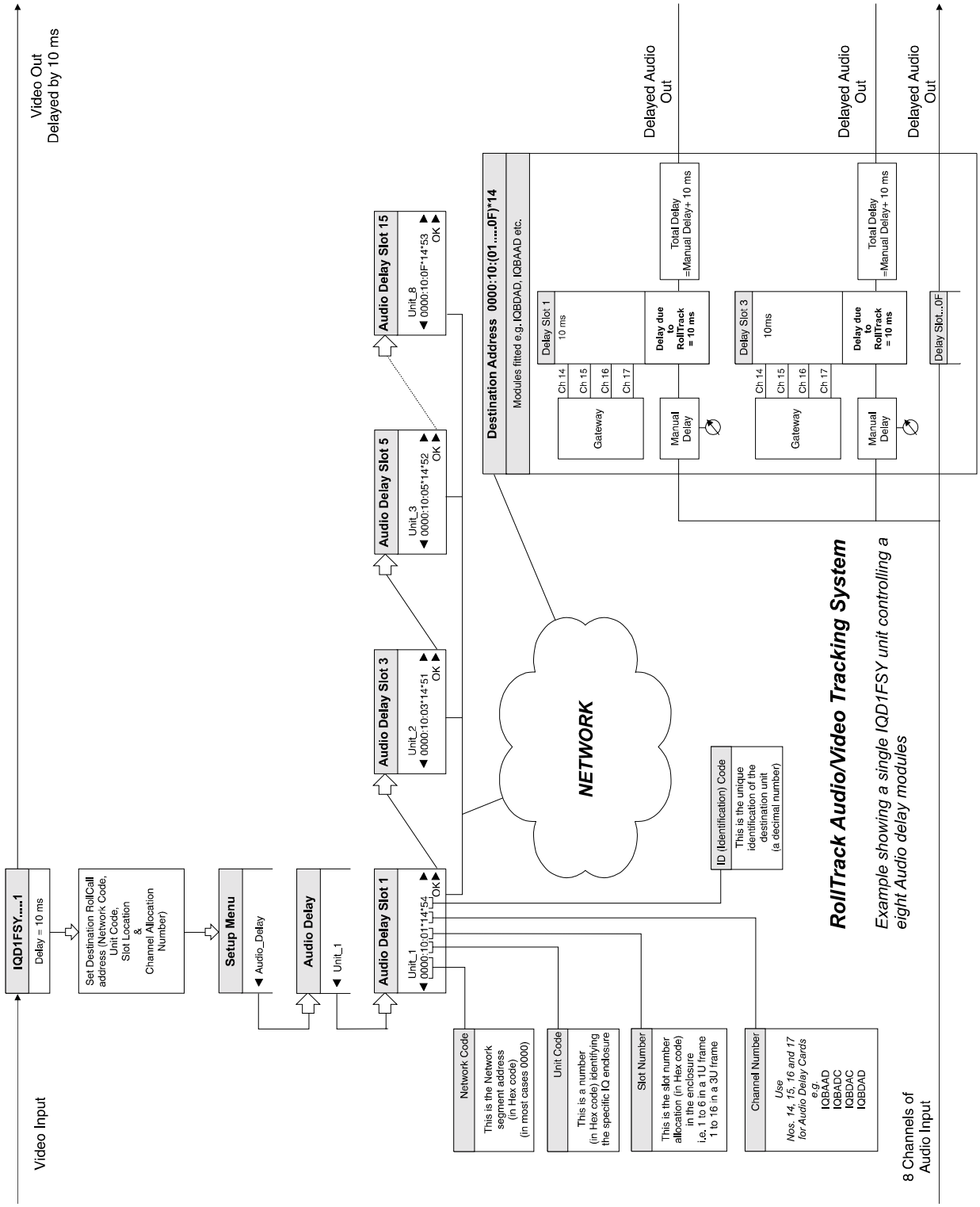
then selecting the *Delay...* Menu of the IQBDAD
then selecting *RollTrack*

Example of Network Addresses with Channel Numbers and ID Numbers

	D1FSY 1	**D1FSY 2**	**D1FSY 3**	**D1FSY 4**
Audio delay 1	0000:10:01*14*54	0000:10:01*15*54	0000:10:01*16*54	0000:10:01*17*54
Audio delay 2	0000:10:03*14*54	0000:10:03*15*54	0000:10:03*16*54	0000:10:03*17*54
Audio delay 3	0000:10:05*14*54	0000:10:05*15*54	0000:10:05*16*54	0000:10:05*17*54
Audio delay 4	0000:10:07*14*54	0000:10:07*15*54	0000:10:07*16*54	0000:10:07*17*54
Audio delay 5	0000:10:09*14*54	0000:10:09*15*54	0000:10:09*16*54	0000:10:09*17*54
Audio delay 6	0000:10:0B*14*54	0000:10:0B*15*54	0000:10:0B*16*54	0000:10:0B*17*54
Audio delay 7	0000:10:0D*14*54	0000:10:0D*15*54	0000:10:0D*16*54	0000:10:0D*17*54
Audio delay 8	0000:10:0F*14*54	0000:10:0F*15*54	0000:10:0F*16*54	0000:10:0F*17*54

The most complex system would be an array of matrix delay clusters




Video Out
Delayed by 10 ms
IQD1FSY.....1
Delay = 10 ms
Set Destination RollCall address (Network Code, Unit Code, Slot Location & Channel Allocation Number)
Setup Menu
Audio_Delay
Audio Delay
Unit_1
Audio Delay Slot 1
Unit_1
0000:10:01*14*54
OK
Audio Delay Slot 3
Unit_2
0000:10:03*14*51
OK
Audio Delay Slot 5
Unit_3
0000:10:05*14*52
OK
Audio Delay Slot 15
Unit_8
0000:10:0F*14*53
OK
Video Input
Network Code
This is the Network segment address (in Hex code) (in most cases 0000)
Unit Code
This is a number (in Hex code) identifying the specific IQ enclosure
Slot Number
This is the slot number allocation (in Hex code) in the enclosure i.e. 1 to 6 in a 1U frame 1 to 16 in a 3U frame
Channel Number
Use Nos. 14, 15, 16 and 17 for Audio Delay Cards e.g. IQBAAD IQBADC IQBDAC IQBDAD
NETWORK
ID (Identification) Code
This is the unique identification of the destination unit (a decimal number)
Destination Address 0000:10:(01.....0F)*14
Modules fitted e.g. IQBDAD, IQBAAD etc.
Gateway
Ch 14
Ch 15
Ch 16
Ch 17
Delay Slot 1
10 ms
Delay due to RollTrack = 10 ms
Manual Delay
Total Delay =Manual Delay+ 10 ms
Delayed Audio Out
Delay Slot 3
10ms
Delay Slot...0F
8 Channels of Audio Input
RollTrack Audio/Video Tracking System
Example showing a single IQD1FSY unit controlling a eight Audio delay modules