V1665

PAL / NTSC TO SDV ADAPTIVE DECODER WITH OPTIONAL FRAME SYNCHRONISER

INSTALLATION AND OPERATION

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V1665
PAL / NTSC TO SERIAL DIGITAL VIDEO (SDV) ADAPTIVE DECODER

1. GENERAL DESCRIPTION

The V1665 is a broadcast quality multi-standard adaptive decoder, and forms part of the Vistek V1600 modular range of interface products. The 3U x 250mm card may be fitted into either the V1601 (1U) or V1603 (3U) 19" rack mountable enclosures, from which it derives its power. All signal inputs and outputs are made via a passive rear module.

In its basic form, without a Frame Synchroniser fitted, the unit converts an analogue colour encoded composite video input to a 270Mbit component Serial Digital Video (SDV) output standard.

A Frame Synchroniser module may be optionally fitted to the decoder. The Frame Synchroniser permits the output of the unit to be timed up to an external reference, with a user programmable offset of up to ± 75 lines relative to the reference.

The V1665 has a high impedance looping input, into which the analogue colour encoded input is presented. The card will detect, and consequently automatically decode, any of the standards listed below:-

PAL B, G, I, M, N
NTSC M, NTSC JAPAN
NTSC 443

The decoder may also be forced into any one of the specified standards, although it is generally recommended that the user leave the card set in automatic (**AUTO**) mode.

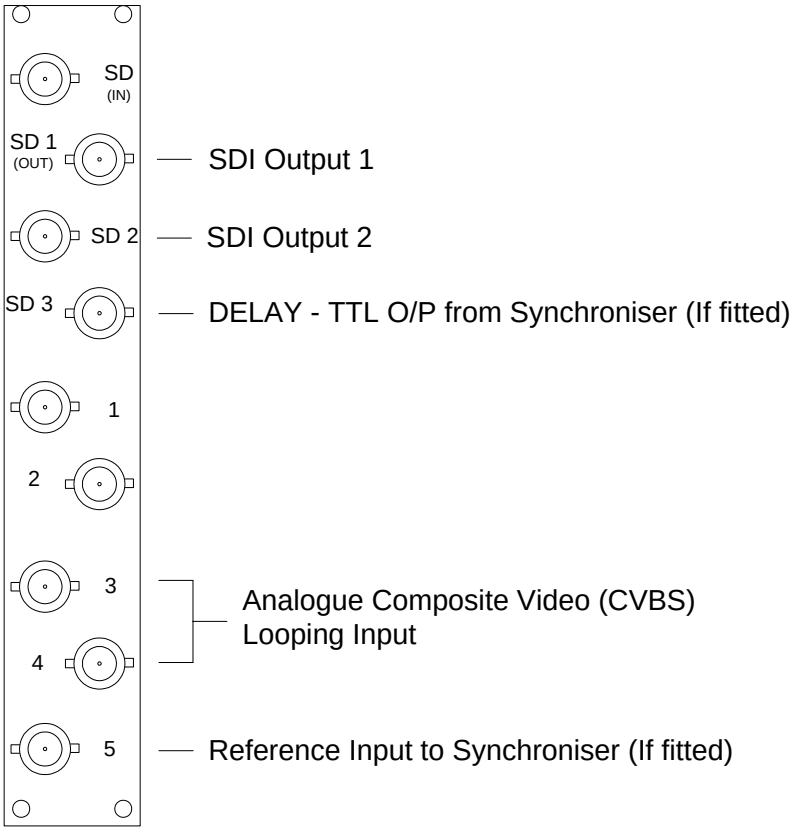
The V1665 has two 270Mbit component Serial Digital Video (SDV) outputs.

Front panel controls enable the user to set up/adjust various operating parameters, and if a Frame Synchroniser option is fitted they may be used to time the unit into an installation.

All parameter settings, for each standard, are stored in non-volatile memory. Thus a unit may be powered down without the settings being lost.

2. INSTALLATION

2.1 REAR PANEL LAYOUT AND SIGNAL CONNECTIONS



BNC Connector	Input / Output Description	Comments
SD (IN)		Not used.
SD 1 (OUT)	SDV Output 1	Cable drive length:- up to 200 metres.
SD 2	SDV Output 2	Cable drive length:- up to 200 metres.
SD 3	Delay O/P (TTL)	Only valid when a synchroniser sub-module is fitted.
BNC 1		Not used.
BNC 2		Not used.
BNC 3	CVBS	High impedance looping input.
BNC 4	Looping Input	
BNC 5	Reference I/P	Only valid when a synchroniser sub-module is fitted.

2.2 FRAME SYNCHRONISER MODULE (OPTIONAL)

A Frame Synchroniser module may be optionally fitted to the V1665. It is located into sockets SKA1, SKA2 and SKA3. Its presence is automatically detected by the on board micro-processor and is consequently integrated into the signal processing path.

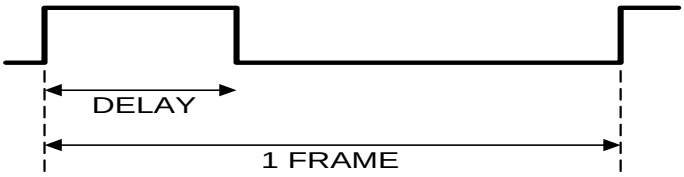
With a Frame Synchroniser fitted, the user may adjust the V1665 output timing relative to the reference input by up to a maximum offset of ± 75 lines. This operation is described in section **5.2 timing parameter selection and adjustment**.

If a Frame Synchroniser module is fitted, but there is no reference input, then the output will be locked to the input video signal, with a user programmable offset. This mode is particularly useful in removing the inherent one line delay introduced by the adaptive 3 line comb within the decoding section of the unit.

2.3 FRAME SYNCHRONISER DELAY

When the Frame Synchroniser delay option is fitted there is a TTL signal to indicate the amount of extra delay inserted above the minimum as specified for the unit. The signal has a constant period of one frame and a variable mark space ratio which depends on the amount of delay inserted. The HIGH portion of the signal indicates the delay.

A typical waveform is as shown below:



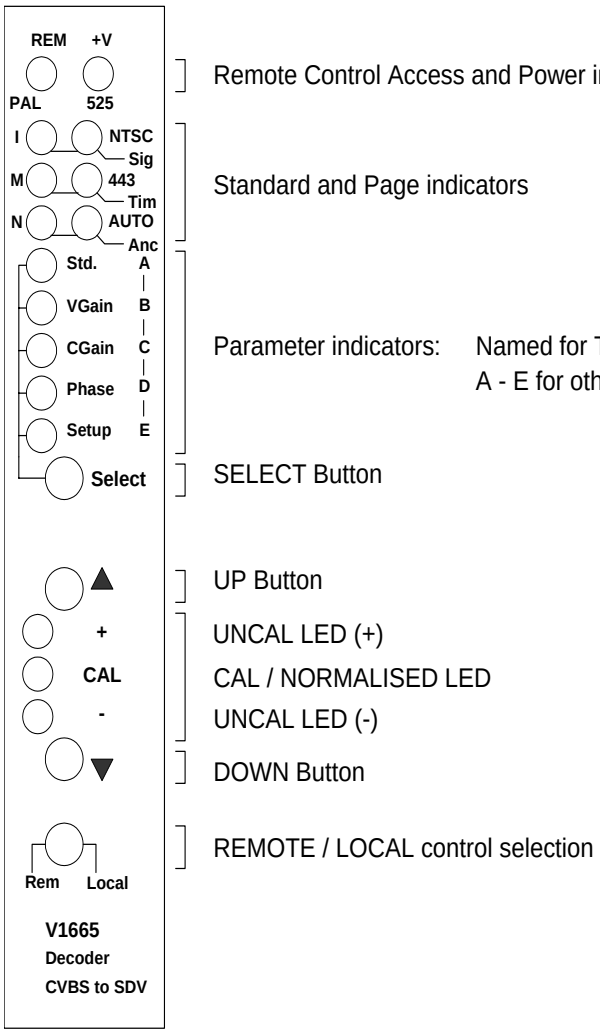
Note: If the input and reference signals are asynchronous then the width of the delay pulse will vary, and will be dependent on the relative timing of the two signals.

2.4 INSERTION DELAY

The insertion delay through the V1665 is dependent on whether a Frame Synchroniser option is fitted. Without a Frame Synchroniser it is deterministic and fixed. With the Frame Synchroniser fitted there is a delay range, and the absolute delay will be dependent on the relative timing between the input video signal and the reference input.
In each case the delay is measured between the composite video input and the input to the SDI serialiser.

Condition	Unit Delay
V1665 + No Frame Synchroniser Module	1 Line + 4.6μs
V1665 + Frame Synchroniser Module	1 Line + 4.8μs (Minimum) 1 Frame + 1 Line + 4.8μs (Maximum)

3. FRONT PANEL LAYOUT



The V1665 has a versatile front panel, shown above. Commonly used controls are directly available, whilst the less used ones are protected from inadvertent use. The panel uses the concept of **Pages** and **Parameters**. Within each **Page** there are a possible 5 adjustable **Parameters**.

There is provision for 5 pages in total, although only 3 are currently used. These are:

Top page (normal operation) — This is the normal operating page. The unit will always enter this page at power up.
See 4. FRONT PANEL DESCRIPTION (NORMAL OPERATION)

Timing Page — This page is used to adjust the Frame Synchroniser timing parameters and input failure modes, and is accessible only when a Frame Synchroniser module is fitted to the card.
See 5. TIMING PAGE (FRAME SYNCHRONISER)

Engineering Page — This page is used to make changes to the decoder processing that it is considered the user will only need to access infrequently (VITS pass/blank, etc..)
See 6. ENGINEERING PAGE

3.1 PAGE/PARAMETER MAP

This table shows all the adjustable **Parameters** in each **Page**. It may be convenient to keep a copy close to the equipment.

	Top Page	Page 1 (SIG)	Page 2 (TIM)	Page 3 (ANC)	ENG.
A	Standard		V Timing		NTSC type
B	Video Gain		H Timing		VITS
C	Chroma Gain		Synch Fail Mode		Adaptive notch
D	Phase		Timing Reset		Delay line PAL
E	Setup/Black				

4. FRONT PANEL DESCRIPTION (NORMAL OPERATION)

4.1 +V INDICATOR

This is a green LED that is illuminated when the module is powered.

4.2 REM INDICATOR

This yellow LED is illuminated when remote operation has been selected and the module is accessed by the DART remote control system.

4.3 VIDEO STANDARD INDICATORS / SELECTION OF VIDEO STANDARD

This is a bank of six yellow LEDs which indicate the operating standard and the status of the input signal.
Please note that selection of the video standard via the front panel may only be achieved if the Local / Remote switch is set to **Loc**. When it is set to **Rem** there is a front panel lockout condition.

Selection of the operating standard is made by first pressing the Select button until the green Standard parameter LED is illuminated, then secondly by pressing the Up or Down buttons (σ or τ respectively) to select the desired standard of operation.

The software allows the user to force any one standard, depicted by the relevant LED being illuminated, or to enter an automatic detect and decode mode, whereby the AUTO LED will be illuminated together with the relevant detected standard LED.

If there is no input signal present, or if the input signal is of poor quality, then the decoder will indicate this by flashing the selected standard LED when in force mode. When in automatic mode the AUTO LED will flash and none of the standard LEDs will be illuminated.

4.4 PARAMETER INDICATORS AND ADJUSTMENT

There are five parameters that may be adjusted by the decoder in the Top Page. These are the video standard, video gain, chrominance gain, demodulation phase and setup/black level. The row of five green parameter LEDs indicate which parameter has been selected, and the status of the non-selected parameters.

Please note that selection and adjustment of any video parameter via the front panel may only be achieved if the Local / Remote switch is set to **Loc**. When this switch is set to **Rem** there is a front panel lockout condition.

Selection of the parameter to be adjusted is made by repeatedly pressing the **Select** button until the relevant green parameter LED is illuminated. The software cycles through each parameter in turn plus a sixth 'dummy' position, within which no parameter is selected (no LED illuminated). This helps to prevent accidental mis-alignment of a parameter.
After selecting the desired parameter, adjustment is made by using the Up and Down buttons (σ or τ respectively). If the selected parameter is adjusted away from the calibrated position the green Cal LED will be extinguished, and one of the red LEDs (+ or -) will be illuminated, dependent on whether the chosen parameter has increased or decreased (Note: any non-selected parameter that has been adjusted away from its calibrated position will flash at low duty cycle). To reset the selected parameter to its calibration position depress the Up and Down buttons (σ and τ) simultaneously.

Adjustment of the video standard (**Standard**) is described in the section **4.3** entitled **video standard indicators / selection of video standard**.

Video gain (**VGain**) may be increased by pressing the Up button (σ) or reduced by pressing the Down button (τ). Video gain amplifies or attenuates all three of the component signals (Y, Cb, Cr) after the demodulation process and each by the same ratio.

Video gain	Max	200%		
	Cal.	100%	Resolution	0.25% steps
	Min	0%		

Chrominance gain (**CGain**) may be increased by pressing the Up button (σ) or reduced by pressing the Down button (τ). Chroma gain amplifies or attenuates both of the colour difference signals (Cb, Cr) after the demodulation process and by the same ratio.

Chroma gain	Max	200%		
	Cal.	100%	Resolution	0.5% steps
	Min	0%		

Demodulation phase (**Phase**) may be adjusted either side of the calibration position by using the Up and Down buttons (σ and τ).

Phase adj.	Max	+180º		
	Cal.	0º	Resolution	0.3º steps (approx.)
	Min	-180º		

The luminance output black level (**Setup**) of the signal may be adjusted either side of the calibration position (0mV black level in all standards) by using the Up and Down buttons (σ and τ).

Setup	Max	+150mV		
	Cal.	0mV	Resolution	0.75mV steps (approx.)
	Min	-50mV		

Please note: this adjustment is made **after** a nominal 54mV pedestal has been removed from 525 line standard inputs (excluding NTSC Japan).

4.5 REMOTE / LOCAL SWITCH

The V1665 may be controlled locally via the front panel, hence this switch will be set to Local. Alternatively, the card may be controlled via the DART remote control system, in which case the switch will be set to Rem.
When in the Rem position the front panel is locked out ie. it is not possible to modify the video standard or to make signal parameter adjustments.

5. TIMING PAGE (FRAME SYNCHRONISER)

5.1 TIMING PAGE ENTRY

Press the Select button and hold in, followed by the Down (τ) button. Entry to the Timing Page will occur immediately, and will be indicated by the **Tim** pair of LEDs (PAL M and 443) flashing simultaneously.

Note: The Timing Page may only be accessed if there is a Frame Synchroniser Module fitted to the card.

5.2 TIMING PARAMETER SELECTION AND ADJUSTMENT

There are 4 adjustable parameters defined in the Timing Page. These are defined in the table below:

	Parameter
A	V Timing Offset
B	H Timing Offset
C	Sync Fail Mode
D	Timing Reset
E	

Selection of the parameter to be adjusted is made by repeatedly pressing the **Select** button until the relevant green parameter LED is illuminated. Then use the Up (σ) and Down (τ) buttons to adjust the chosen parameter as defined below.
To reset the chosen parameter to its calibration position depress the Up (σ) and Down (τ) buttons simultaneously.

The output of the decoder is vertically co-timed to the reference input when **V Timing Offset** is in the Cal. position (Green Cal. LED illuminated). If required the output may be advanced or delayed with respect to the reference by a maximum of 75 lines.

V Timing Offset	Max	+ 75 lines		
	Cal.	0 lines	Resolution	1 line
	Min	- 75 lines		

The output of the decoder is horizontally co-timed to the reference input when **H Timing Offset** is in the Cal. position (Green Cal. LED illuminated). If required the output may be advanced or delayed with respect to the reference by a maximum of ± 1/2 line.

H Timing Offset	Max	+ 1/2 line		
	Cal.	0 line	Resolution	37 ns

Min - 1/2 line

The Frame Synchroniser offers three modes of operation when the input signal fails/disappears (**Sync Fail Mode**). These are:

Sync Fail Mode	(σ)	Freeze picture.
	Cal.	Freeze picture for 3 seconds, then cut to black
	(τ)	Cut to black.

All of the timing parameters may be reset to their respective normalised positions by following the procedure described below:

1 Select the **Timing Reset** parameter.

2 Depress the Up (σ) and Down (τ) buttons simultaneously, and keep both depressed for 5 seconds.

Successful timing reset will be indicated by the **Timing Reset** LED **(D)** being extinguished and the **V Timing Offset** LED **(A)** illuminating.

5.3 TIMING PAGE EXIT

Press the Select button, followed by the Down (τ) button. The decoder will exit the Timing Page immediately, and resume normal front panel operation.
If the unit is left in the Timing Page for more than five minutes, during which no button has been pressed, then the decoder will timeout from this mode and revert to normal front panel operation.

6. ENGINEERING PAGE

6.1 ENGINEERING PAGE ENTRY

Press the Select button and hold in, followed by the Down (τ) button.
Keep both buttons depressed for 5 seconds until all six yellow standard LEDs become illuminated simultaneously. This indicates that the decoder has entered the Engineering Page.

6.2 ENGINEERING PARAMETER SELECTION AND ADJUSTMENT

Scroll around the five parameters using the Select button. The engineering parameter functions may be switched ON and OFF by using the Up and Down (σ and τ) buttons respectively.
Engineering parameters are defined as:-

Parameter (Panel Legend)	Cal. LED	Engineering Page Parameter Function	Comments
A	ON OFF	NTSC NTSC Japan	Default (1)
B	ON OFF	Pass vertical interval data Blank vertical interval data	Default 625 Default 525
C	ON OFF	Adaptive notch:- ON Adaptive notch:- OFF	Default PAL I / PAL N Default all other standards
D	ON OFF	Adaptive delay line PAL Simple PAL	Default all PAL standards Default all other standards
E	OFF ON	(+) LED:- Video AGC (-) LED:- Chroma AGC (+) and (-) LEDs:- Combined AGC:- OFF	 Default (2)
All 5 LEDs	Depress the + and - buttons for 5 seconds for Factory Initialisation of all parameters in all standards (except timing parameters, which may be normalised within the timing page). After successful Factory Initialisation the decoder will automatically resume normal front panel operation.		

(1) NTSC or NTSC Japan selection is only available when in the NTSC standard setting.
(2) See section **8.2 automatic gain control** for a description of the on board AGC options.

6.3 ENGINEERING PAGE EXIT

Press the Select button, followed by the Down (τ) button. The decoder will exit the Engineering Page immediately, and resume normal front panel operation.
If the unit is left in the engineering page for more than five minutes, during which no button has been pressed, then the decoder will timeout from this page and revert to normal front panel operation.

7. TECHNICAL SPECIFICATION

Analogue Input (Looping)

Format	PAL B, G, I, M, N, NTSC M, NTSC Japan, NTSC 443
Level	1V p-p composite (terminated)
Connector	BNC
Impedance	75Ω (external)
Return loss	< - 35dB to 5.5MHz

Reference Input (Frame Synchroniser fitted)

Format	PAL B, G, I, M, N, NTSC M, NTSC Japan, NTSC 443
Level	Standard level Black and Burst (or 1V p-p composite)
Connector	BNC
Impedance	75Ω (internal)
Return loss	< - 35dB to 5.5MHz

Serial (SDV) Outputs (2)

Format	EBU Tech.3267 ANSI / SMPTE T14.22/082
Data rate	270 Mb/s
Connector	BNC
Impedance	75Ω
Return loss	< - 15dB 5-270MHz
Amplitude	800mV p-p terminated
DC offset	0V +/- 0.5V
Rise and fall times	0.75-1.5 ns
Jitter	< 0.2 UI p-p
Drive length	up to 200m (Belden 8281)

Video Performance

Y frequency response	< 0.2dB to 5.5MHz
Y non-linearity	< 1.5 %
Chrominance non-linearity	< 1.5 %
2T pulse	< 1 % K
2T pulse / bar	< 0.5 % K
Chroma/luma timing error	< 10 ns
Subcarrier rejection	> 40 dB
Signal to noise ratio	> 55 dB (unweighted)

Miscellaneous

Power consumption	9W approx.	Frame Synchroniser **NOT** fitted.
	12W approx.	Frame Synchroniser fitted.
Insertion delay	1 line + 4.6μs	Frame Synchroniser **NOT** fitted.
AGC correction range	Up to +1.5dB oversized input signal (all video standards)	
	Down to - 6.0dB undersized input signal (all video standards)	
AGC time constant	1 second (approximately)	

8. APPENDIX

8.1 ON BOARD ADJUSTABLE COMPONENTS

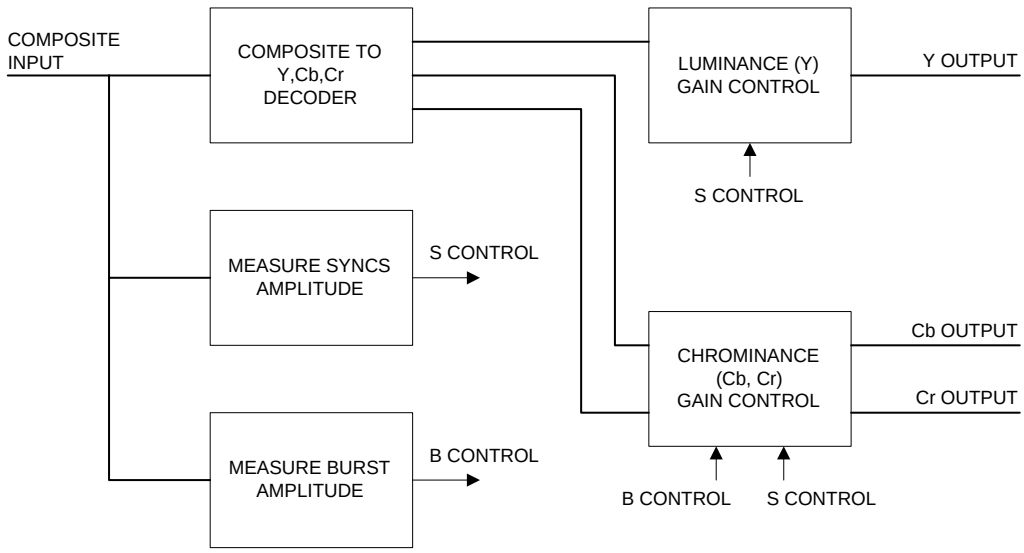
Circuit Reference	Description
VR1	Syncs to picture timing alignment.
VR2	625/525 line standard discrimination.
VR3	Luminance gain alignment:- 625 input
VR4	Luminance gain alignment:- 525 input

Note: The table above is included for information only. Users are strongly advised not to adjust these components, as to do so will mis-align the related function.

8.2 AUTOMATIC GAIN CONTROL

The concept of the on board Automatic Gain Control (AGC) is to measure an input signal parameter level to determine if it is too high, or low, compared to a nominal level. Internal processing then applies the inverse gain error to the signal path data, hence correcting the output signal level.

AUTOMATIC GAIN CONTROL (AGC)
BLOCK DIAGRAM

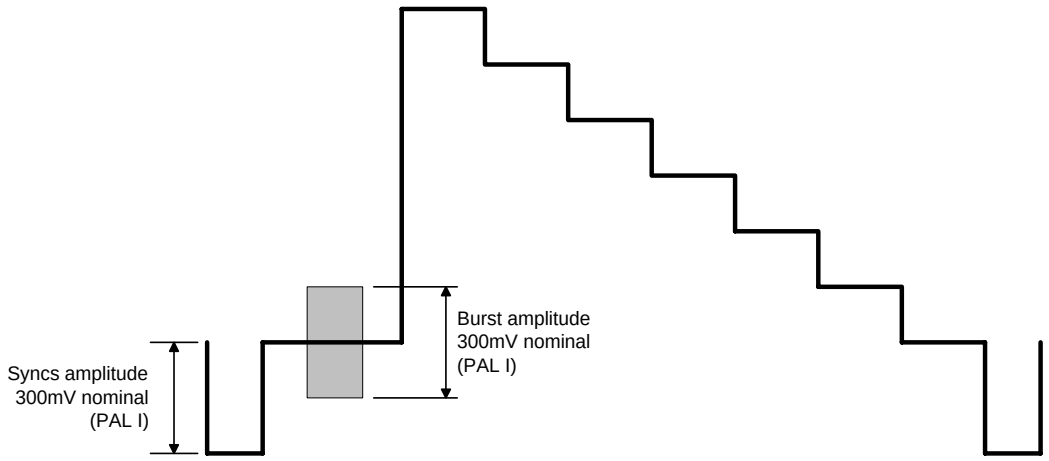


There are four AGC control options:

(i) Video
(ii) Chroma
(iii) Combined (Luminance and Chroma)
(iv) AGC off

Selection of the desired AGC control option is made via the front panel. See **6.2 engineering parameter selection and adjustment**.

Two input signal parameters are measured in order to produce the AGC control signals; syncs and burst amplitude (see below).



The two derived control signals are then applied to the relevant gain control blocks, as described in the following sub-sections.

8.2.1 Video AGC

The amplitude of the syncs is measured, and subsequently compared against the appropriate nominal level (300mV in PAL I). The inverse gain error is then applied to all three component signals (Y, Cb, Cr). For example, if the measured syncs amplitude is 150mV, then the correction gain applied to the three component signals is x2 (ie 300 / 150).

The burst amplitude control signal is **NOT** used in the Video AGC option.

8.2.2 Chroma AGC

The peak to peak amplitude of burst is measured, and subsequently compared against the appropriate nominal level (300mV in PAL I). The inverse gain error is then applied **ONLY** to the two component colour difference signals (Cb and Cr). For example, if the measured burst amplitude is 200mV, then the correction gain applied to the two component colour difference signals is x1.5 (ie 300 / 200).

The syncs amplitude control signal is **NOT** used in the Chroma AGC option, and the luminance (Y) channel remains unaffected.

8.2.3 Combined (Luminance and Chroma) AGC

In this option the syncs amplitude control signal is used to apply gain correction **ONLY** to the luminance (Y) channel, and the burst amplitude control signal is used to apply gain correction to the two component colour difference signals (Cb and Cr).

8.2.4 AGC Off.

All AGC control functions are switched off, and the three component signals (Y, Cb, Cr) are passed through to the output unaffected by the syncs and burst gain control signals.

8.2.5 AGC Control Ranges And Time Constant.

Input signal ranges, over which the AGC circuitry will apply correction (without clipping or distortion):-

PAL I	- 6dB to +2.5dB
NTSC	- 6dB to +1.5dB

AGC time constant:-

1 second (approximately)