ROSTEC Engineering
Phone +45 3967 6438 Fax +45 3966 6438 E-mail rostec@rostec.com Website www.rostec.com

ASD8V Reference Generator

ROSTEC ASD8V Reference Generator

Revision 6.3
June 21, 2004

(serial numbers xxxxN)

General description

Operational description

Functional description

Detailed technical description

ASD8V Reference Generator

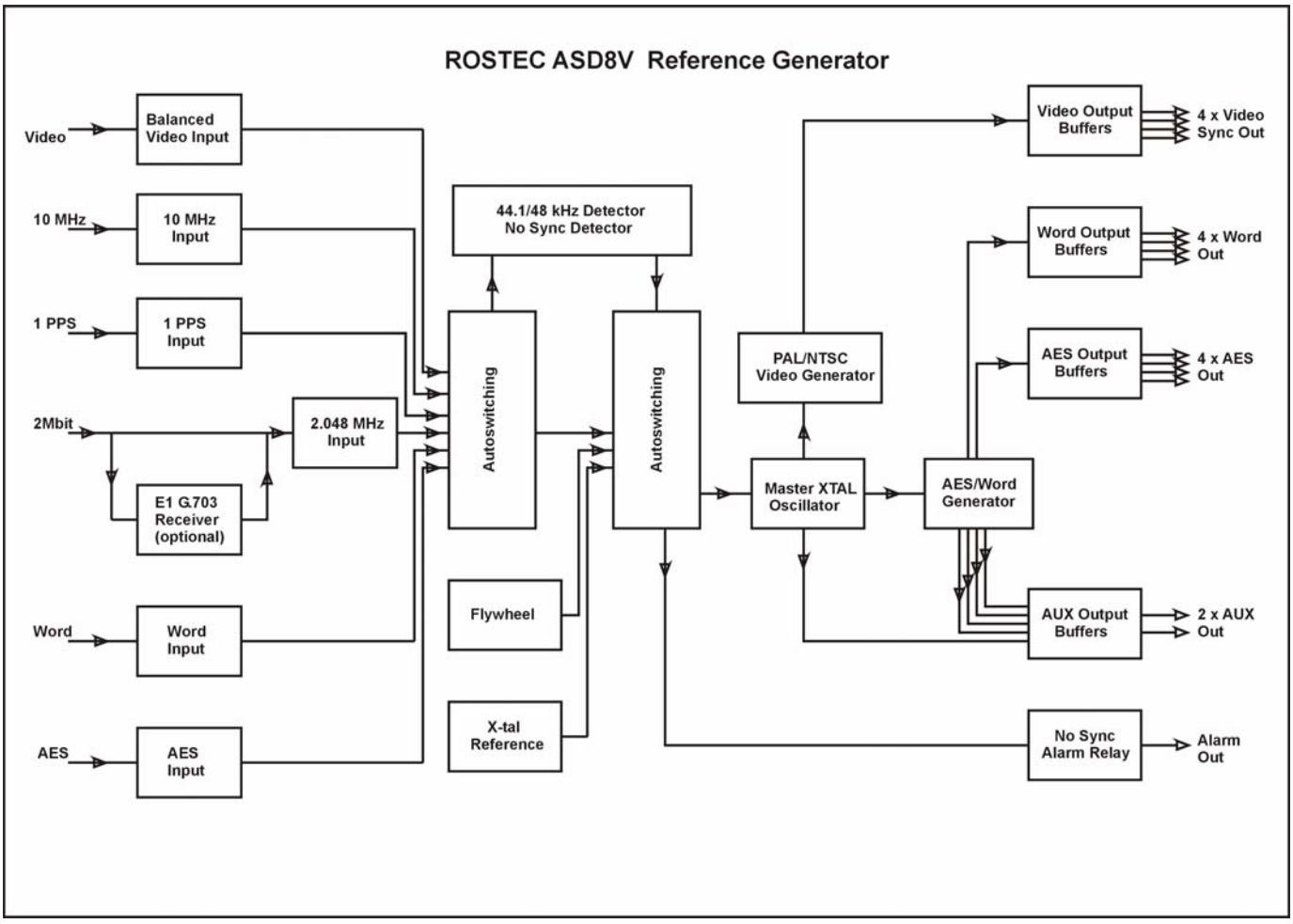
Features

- PAL 25 Hz or NTSC 29.97 Hz Video output
- 100/75 EBU PAL Color Bar
- 100/7.5/75/7.5 NTSC Color Bar
- Black burst or Sync Only select
- AES and Word outputs locked to Video
- AUX outputs for non standard clocks
- Sync to Video frame (no color subcarrier lock)
- Sync to 2.048 MHz clock or 2 Mbit E1 CCITT G703/704 formats (optional board)
- Sync to GPS 10 MHz
- Sync of Video frame to GPS 1PPS
- Sync to AES/Word
- Internal GRADE 1 Oven Crystal Reference
- Easy operation via auto priority input switching
- Build in flywheel for extended sync safety
- Glide mode efficiently absorbs sync drop-outs
- Excellent jitter and wander specifications

General description

The ASD8V is a Grade-1 crystal controlled Digital Reference Generator designed to operate as master or as slave in a video/audio studio environment.
It generates PAL 25 Hz, 625 lines or NTSC 29.97 Hz, 525 lines Video, AES 11 and SDIF-2 Word Clock. It supports 44.1 kHz, 48 kHz and 96 kHz output sample frequencies but is able to output non-standard clocks (like Pro-Tools super clock) on the AUX outputs.
It runs on an internal Oven Crystal Reference oscillator, but it is able to lock to standard PAL/SECAM/NTSC video, 10 MHz GPS, 1PPS GPS, 2.048 MHz clock, 2 Mbit E1 G703/G704, SDIF-2 Word or AES/EBU.
The genlock mechanism is based upon an extensive sync safety philosophy, efficiently absorbing sync dropouts by means of a built in flywheel and a unique glide principle.

Simplified Block Schematic



Signal flow

The heart of the ASD8V is a high grade crystal oscillator built into a temperature controlled oven together with all the necessary voltage references and regulators for its operation. This scheme is far superior to a standard temperature compensated xtal oscillator, and the result is an impressive stability than only can be surpassed by a Rubidium or Cesium source.
The ASD8V always uses this oscillator as the central source for all video, AES and word clock outputs, no matter if it runs on its own or if it is locked to an external sync source. When the generator locks to an external sync, it simply tunes the crystal oscillator to fit the incoming reference. Thus the timing relationship between the Video, AES and Word outputs is never broken apart, and the result is that all outputs are perfectly synchronized to the external reference.

This mechanism is the basis for the ASD8Vs extensive sync safety philosophy. When the external sync is lost or interrupted, the oscillator simply lets go of the continuous tuning control, but keeps on running at the last received frequency information by means of an internal flywheel. When the sync returns the oscillator gently resumes the tuning control, slowly correcting for the accumulated drift in time. If the flywheel is exhausted before the sync returns, the oscillator softly revert to it own internal reference.
All changes back and forth between references are done slowly creating a gradual frequency change in order to minimize lock problems of the equipment that is synchronized to the ASD8Vs outputs
This unique “glide” principle combined with the internal fly-wheel constitutes an efficient protection against an erratic sync or against sync dropouts. The scheme ensures continuous synchronization of the connected equipment, even when large dropouts of the incoming sync signal are to be expected,
Further, the phase locked loop exhibits an excellent Jitter Rejection Ratio, and is able to clean up and stabilize a jittery house sync, an important ability when the generator is connected to delicate or sensitive equipment.

Jump mode vs. glide mode

Glide mode is extremely efficient when it comes to compensate for sync drop outs, f. ex. in case of a faulty wire or an intermittent connection. The reason is that when the sync drops out it usually returns with the same timing except for a small drift due to differences in reference frequencies of the ASD8V and the connected unit. The accumulated time difference is quite easily compensated for by the ASD8Vs oscillator and the incident will normally pass unnoticed.
There are instances where this is not the case. If the external unit is switched on and off, the time difference can be any value between zero and half a cycle of the incoming sync. If the sync source is Video or GPS 1PPS it is simply not acceptable to wait for the oscillator to catch up in glide mode.
To overcome this, the ASD8V automatically switches to jump mode when the time difference is bigger than a preset value, set by an internal jumper *(see jumper settings, video jump window)*. The ASD8V will then jump into coarse sync and make the last fine correction in glide mode.
When a jump is performed *all* output signals jump. This is necessary in order to maintain the correct timing between Video, AES and Word outputs

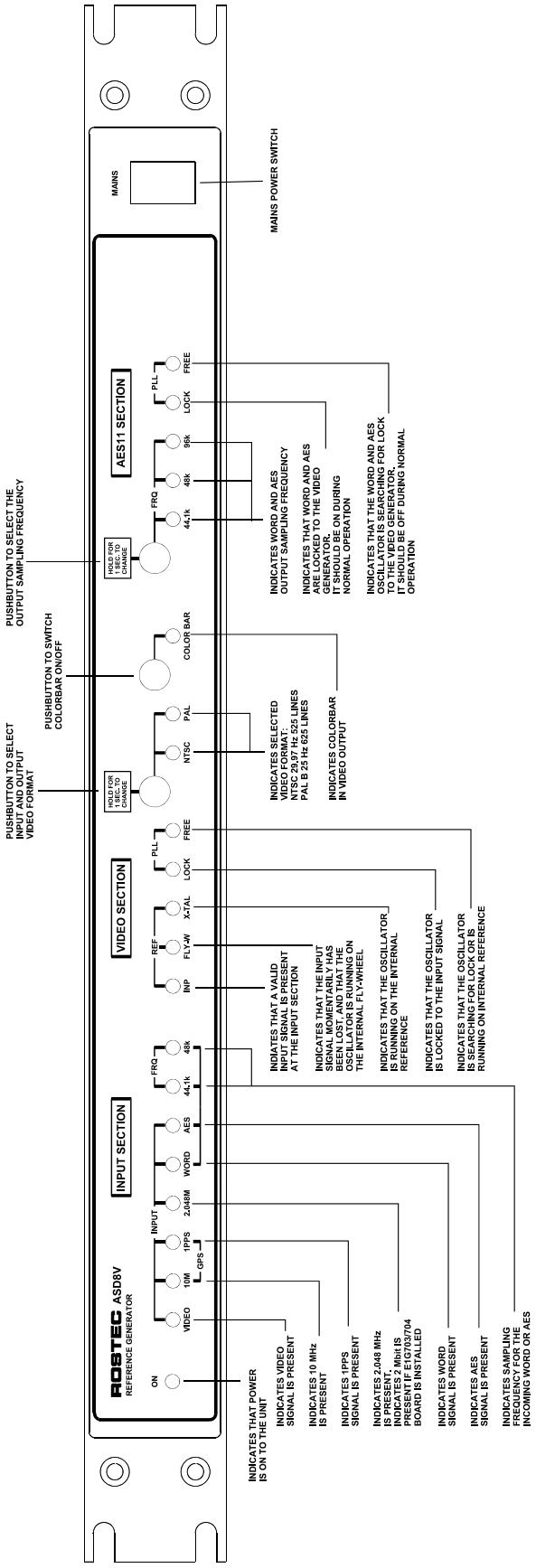
Incoming Sync hierarchy

There is no manually operated input selector. All input switching is done automatically. When the ASD8V senses an input, it checks certain critical parameters of the signal before switching the input on. If more than one input is connected, the circuit selects the active input by priority. The order of priority is as seen on the front plate from left to right:

1. Video
2. 10 MHz GPS
3. 2.048 MHz (2 Mbit)
4. Word clock
5. AES

The 1PPS (1 Pulse Pr. Second) signal only works together with the 10 MHz as part of the GPS synchronization. It is not part of the auto switching scheme.

Front Panel Quick Guide



Front panel controls and indicators

ON

This LED indicates that main power is switched on.

Input section: VIDEO

This LED indicates that a video signal is present. Acceptable formats are PAL, NTSC or SECAM. Color burst or color information are not necessary.
Note that the generator will only lock to the incoming video if the incoming format is identical to the selected output format of the generator.
Trying f. ex. to synchronize to an incoming NTSC video while the output of the ASD8V is selected to PAL will not be successful. The generator will issue a warning by flashing the LOCK and VID LEDS.

Input section: 10M

This LED indicates that a 10 MHz from a GPS receiver is present at the input. The signal will be evaluated for continuity for 1 second before the indicator lights up.

Input section: 1PPS

This LED indicates that a 1PPS (1 Pulse Pr. Second) signal from a GPS receiver is present. Note that the indicator will not light up if the GPS 10 MHz is missing. The two signals are both necessary to perform the time alignment of the 1PPS and the video frame

Input section: 2.048 MHz

This LED indicates that a 2.048 MHz clock from a 2 Mbit system is present. The signal will be evaluated for continuity for 1 second before the indicator lights up. When a 2 Mbit G703/704 board is installed, the signal is evaluated for both correct frame format and continuity for 1 second before the indicator lights up.

Input section: WORD

This LED indicates that a Word Clock is present at the input

Input section: AES

This LED indicates that an AES signal is present at the input. The signal is evaluated for frame format, biphase coding violation and out of frequency range

Input section: 44.1k** and **48k

These LEDs indicate the incoming sample frequency detected at the word input or the AES input

Video section: INP

This LED indicates that a signal is present at the input section and that the oscillator is using the signal as a reference

Video section: FLY-W

This LED indicates that the fly-wheel is active. This happens when an input is lost after having been used by the oscillator as the reference. The indicator will extinguish when the fly-wheel is exhausted. *(see jumper settings, flywheel time).*

Video section: X-TAL

This LED indicates that the oscillator runs on its internal reference.

Video section: LOCK

This LED indicates that the oscillator is locked to the reference signal coming from the input section.

Video section: FREE

This LED indicates that the oscillator is not locked to any *incoming* source. If this happens while the INP indicator is on, it means that the oscillator is searching for lock. If it persists it is because the input signal is not accepted as a source.
When the X-TAL indicator is on, FREE should always be on.

Video section: Pushbutton NTSC/PAL

Pushing this button will toggle between the two video formats. The pushbutton has a 1 second time delay and is recessed into the front plate as a protection against accidental use.
When the format is changed, the generator will initialize a master reset.

Video section: NTSC and PAL

These LEDs indicate the video format selected by the pushbutton. The value is stored in memory at power down and will be read from memory again when the unit is powered up.

Video section: Pushbutton COLORBAR

Pushing this button will switch the colorbar in the video signal on/off. It has no time delay except for the standard de-bouncing delay of 50 mSec.

Video section: COLORBAR

This LED lights up when colorbar is on

AES section: Pushbutton

The AES/Word generators output sampling frequency is selected by this pushbutton by toggling between the available frequencies. The pushbutton has a 1 second time delay and is recessed into the front plate as a protection against accidental use. The output sampling frequency can be chosen independently of the input sampling rate frequency.

AES section: 44.1k, 48k and 96k

These LEDs indicate the selected sampling rate frequency. The value is stored in memory at power down and will be read from memory again when the unit is powered up.

AES section: Lock

This LED indicates that the AES and Word generator is locked to the Video generator via the internal PLL.
It should light up during normal operation.

AES section: FREE

This LED indicates that the AES and Word generator has broken free of the Video generator.
It will light up for approximately 3 seconds when the unit is powered up, and it will light up briefly when output sample rate frequency is changed or when the video generator performs a time jump. It should be off during normal operation and can be considered a status indicator.

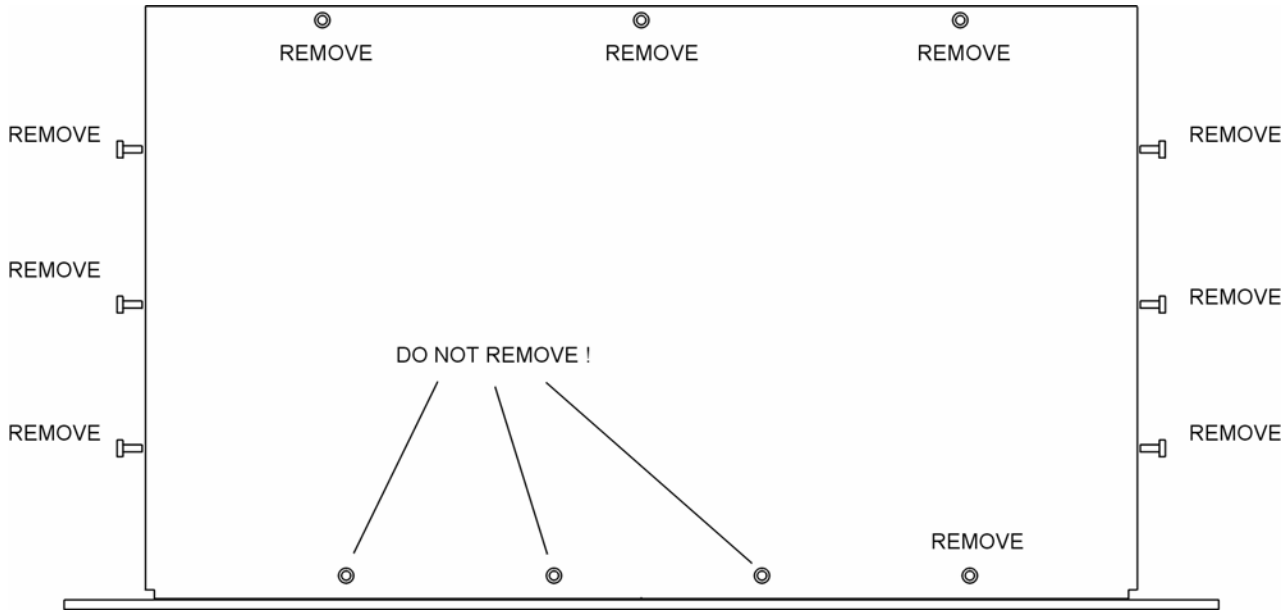
Power Switch

The switch turns main power on and off

There are no special considerations to observe when powering up the unit. Allow a warm up period of 8 minutes to let the internal oven crystal reference settle to its 0.2 ppm absolute frequency precision. If an external reference is connected to any of the generators inputs upon start up, the generator will immediately be able to achieve lock, as long as the incoming reference is better than +/-30 ppm in absolute frequency precision.

Opening the box

To gain access to the circuit boards the cover has to be removed. It is secured by 4 screws on the top and 3 screws on each side of the box**. Leave the 3 screws marked DO NOT REMOVE.**



Jumper settings

1PPS input

This jumper selects the function of the leftmost 10M input (as seen from the back panel).
In position 10 MHz, the connector is looped thru to the other 10 MHz input connector
In position 1PPS the GPS input circuit will accept the 1PPS pulse from a GPS receiver. The pulse is used to align the video frame to the global 1 second time update pulse.

Flywheel time

This jumper defines the time the oscillator will wait for the external sync to return when it is momentarily lost. During this time the oscillator runs on the last received frequency information from the external sync. At time out the oscillator returns to its own internal reference.
Settings are:

1. 8 seconds
2. 16 seconds
3. 32 second
4. 64 seconds
5. 128 seconds

Video jump window

This jumper defines the size of the time window which controls whether the video sync mechanism will be in glide mode or in jump mode.
If the time difference between the incoming video signal and the output video signal is greater than the size of the time window, the main oscillator performs a time jump to achieve sync.
If the time difference between the incoming video signal and output video signal is less than the size of the time window, the main oscillator glides to achieve sync.
Settings are:

1. 0.5 msec
2. 1.0 msec
3. 2.0 msec
4. Never Jump

Video options

These jumpers set the video output Subcarrier, luminance and chrominance filters.

Jumper 0 enables colorburst (Subcarrier)
Jumper 1 is spare
No jumper at pos. 2, 3 enables luminance filter 1
Jumper at pos. 2 enables luminance filter 2
Jumper at pos. 3 enables luminance filter 3
No jumper at pos 4, 5 enables Chrominance filter 1
Jumper at pos. 4 enables chrominance filter 2
Jumper at pos. 5 enables chrominance filter 3

(*See appendix for description of filter responses*)

AUX outputs:

These jumpers select the output routed to the AUX1 and the AUX2 output buffers.

AUX1, 1: CBL (AES block start, Z-preamble)
AUX1, 2: Word clock (X-preamble)
AUX1, 3: Word clock x 2
AUX1, 4: Word clock x 64
AUX1, 5: Word clock x 128
AUX1, 6: Word clock x 256 (Pro-Tools Super Clock)

AUX2, 1: Open solder pad (for experiments)
AUX2, 2: Video sync (no colorburst, no chrominance no luminance).
LINK: Links the signals inputs of the AUX1 and AUX2 buffers, in effect placing their inputs in parallel.
Note: Place only one jumper in the AUX1 section and place only one jumper in the AUX2 section. Placing more than one jumper pr. section will create a buffer conflict!

AUX level

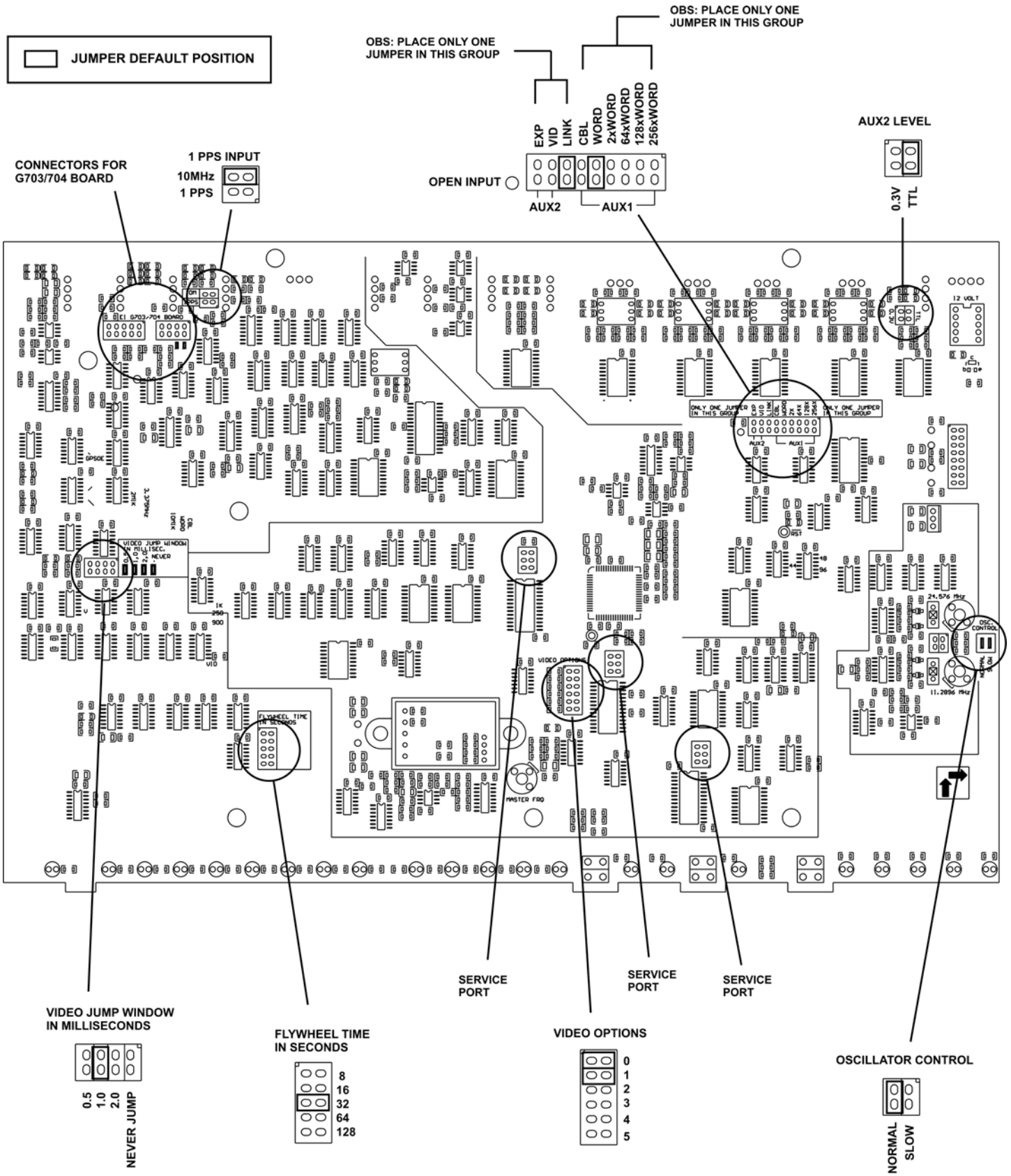
This jumper selects the output level of the AUX2 buffer.

VID: Selects standard video output level, i.e. 600 mV unterminated, 300 mV when terminated by 75 Ohms
TTL: Selects standard TTL level, i.e. +5V unterminated, 2,5V when terminated by 75 Ohms.

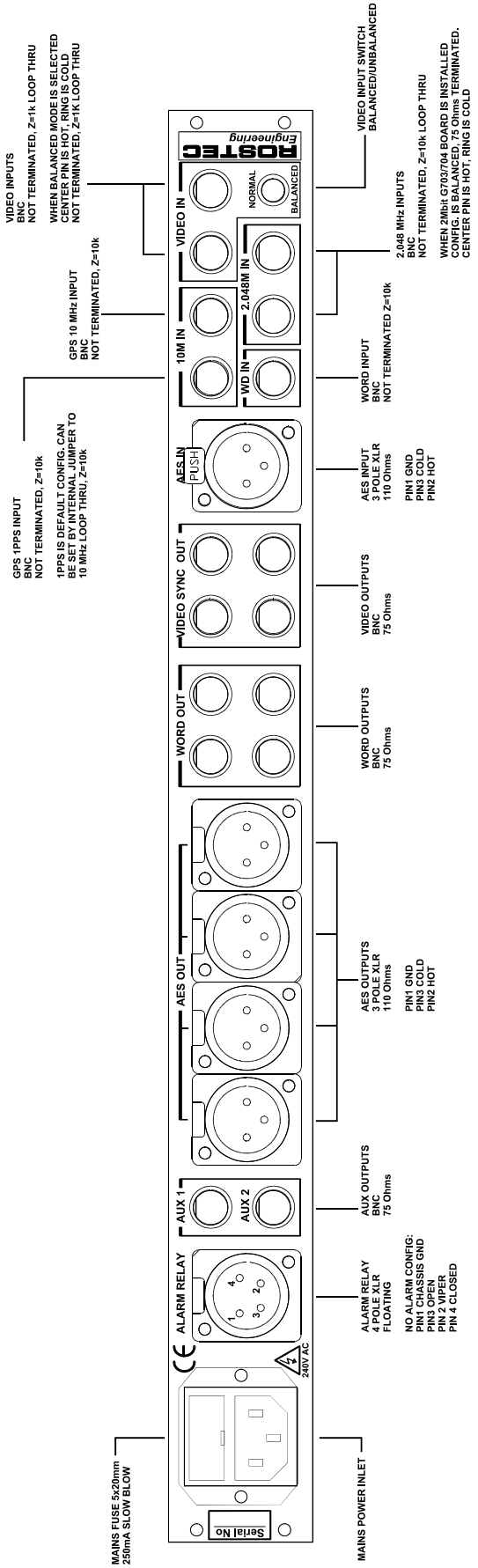
Oscillator control

This jumper controls the maximum frequency tuning range for the AES master oscillator. In effect it defines how fast the AES section is able to follow the video section.
Settings are:

1. Normal, +/- 100 ppm
2. Slow, +/-25 ppm


JUMPER DEFAULT POSITION
OBS: PLACE ONLY ONE JUMPER IN THIS GROUP
OBS: PLACE ONLY ONE JUMPER IN THIS GROUP
EXP
VID
LINK
CBL
WORD
2xWORD
64xWORD
128xWORD
256xWORD
OPEN INPUT
AUX2
AUX1
AUX2 LEVEL
0.3V
TTL
CONNECTORS FOR G703/704 BOARD
1 PPS INPUT
10MHz
1 PPS
VIDEO JUMP WINDOW IN MILLISECONDS
0.5
1.0
2.0
NEVER JUMP
FLYWHEEL TIME IN SECONDS
8
16
32
64
128
SERVICE PORT
SERVICE PORT
SERVICE PORT
VIDEO OPTIONS
0
1
2
3
4
5
OSCILLATOR CONTROL
NORMAL
SLOW

Back Panel Quick Guide



Back Panel Connections

Video input

The video input circuit consists of a balanced input buffer configuration. The center pin is the positive input and the ring is the negative input. Normal mode and balanced mode can be selected by a toggle switch beneath the two video connectors. In normal mode (unbalanced) the ring is connected to ground.
The input is not internally terminated, and the two input connectors are configures as loop thru, allowing for a serial chain configuration with a single 75 Ohms termination at the end of the chain.
The video input accepts standard Negative Going Sync Video with amplitudes ranging from 0.1 to 3.0 V.
In balanced mode the input amplitude + the common mode voltage must not exceed 6.0V

The ASD8V will lock to standard interlaced PAL 25 Hz 625 lines, NTSC 29.97 Hz 525 lines or SECAM 25 Hz video. The video signal *must* be interlaced, as the input sync separator extracts timing information from the odd/even field information in the composite sync signal.

Note: The video lock mechanism only distinguishes between odd and even frames. It does not provide a color subcarrier lock and thus does not perform a PAL-4 or a PAL-8 lock between input video and output video.

If the time difference between the incoming video frame and the output video frame is smaller than 8 lines, the ASD8V will glide into sync. If the time difference is greater than 8 lines the ASD8V will perform a time jump. *(See jump mode vs. glide mode)*
All lock functions are identical in PAL and NTSC mode. Sync to SECAM only works when the Video output is selected to PAL

10 MHz input

The 10 MHz input is TTL compatible, unbalanced, unterminated and 10 kOhms, intended for use with GPS receivers. There is no position information in the 10 MHz signal, so the video generator locks the leading edge of the video frame to the leading edge of the incoming square wave. When the input is lost and reestablished, the generator simply again grabs the closest available leading edge of the 10 MHz signal and locks the leading edge of the video frame to it. In case of a sine wave input, the lock point will be approx. 20 nsec after the positive going zero crossing.
The circuit evaluates the incoming signal for errors and continuity for 1 second before it locks on to it.

1PPS input

The 1PPS input is TTL compatible, unbalanced, unterminated and 10 kOhms, intended for use with GPS receivers.
The 1PPS works in combination with the 10 MHz signal from the same GPS receiver, providing the positional information necessary to align the video frame (frame 1 in the PAL-8 sequence) to the global time update pulse of the GPS satellite system. When the 10 MHz input is not present, the 1PPS will not be active

If the time difference between the 1PPS and the video frame is smaller than approx 8 video lines, the ASD8V will glide into sync. If the time difference is greater than 8 video lines the ASD8V will perform a time jump. *(See jump mode vs. glide mode)*
A jumper on the PCB selects if the leftmost 10 MHz input connector is 1PPS or it is 10 MHz looped thru (default) to the other 10 MHz input connector

It is important to use a high quality GPS receiver with a stable output. If the 1PPS is jumping around in time the ASD8Vs outputs may glide back and forth or also jump around as the result, simply because the oscillator is trying to track the pulse position.
Many high quality GPS receivers are able to suppress the 1PPS pulse if it is not reliable, only outputting the 1PPS when it is absolutely correct in time.
The ASD8V can fully accommodate this scheme. It only needs one 1PPS (one pulse!) to place the video frame correct. It will then keep this correct position as long as the 10 MHz from the GPS receiver is available.

Note: GPS 1PPS timing and NTSC timing have no useful relationship. Use only the 10 MHz GPS input when the generator runs in NTSC video mode

2.048 MHz input

The 2.048 input is in principle identical to the 10 MHz input. It is TTL compatible, unbalanced, unterminated and 10 kOhms.
There is no position information in the 2.048 MHz signal, so the video generator locks the leading edge of the video frame to the leading edge of the incoming square wave. When the input is lost and reestablished, the generator simply again grabs the closest available leading edge of the 2.048 MHz signal and locks the leading edge of the video frame to it.
The circuit evaluates the incoming signal for errors and continuity for 1 second before it locks on to it.

2 Mbit E1 G703/704 Board

An optional decoder board for the 2 Mbit E1 CCIT G703/704 format is available. The board has a transformer balanced 75 Ohms E1 line receiver interface, which performs clock recovery and jitter attenuation. The jitter attenuator is based on a local crystal controlled reference clock, able to phase lock to the recovered clock.
This scheme dramatically reduces incoming jitter, which often can be substantial on an E1 line.
The output circuit exhibits excellent output clock stability, and the receiver has a jitter tolerance exceeding the requirements of Publications 43802, 43801, 62411 amended, TR-TSY-000170 and CCITT REC G.823
The recovered clock is evaluated for errors and continuity for 1 second, after which it is routed to the normal 2.048 MHz input circuit.
Loss of signal is detected upon receiving a string of 175 consecutive zeroes, after which frequency control immediately is handed over to the main flywheel circuit. The signal is accepted again when ones density reaches 12.5%, based on 175 bits periods with less than 100 consecutive zeroes, as is prescribed in ANSI T1.231-1993.

Word input

The Word input is TTL compatible, unbalanced, unterminated and 10 kOhms The Word signal contains only left/right position information (X/Y preamble) so the video generator locks the start of the video frame to the leading edge of the incoming square wave. The mechanism is the same as used by the 10 MHz and 2.048 MHz inputs
The incoming sample rate frequency is automatically detected and indicated on the front panel LEDs.
44.1 kHz and 48 kHz are supported

AES input

The AES input is AES/EBU and S/PDIF compatible, balanced and terminated with 110 Ohms.
The signal is evaluated for correct frame format, biphase coding violations and out of frequency range before it is routed to the sync mechanism. The incoming sample rate frequency is automatically detected and indicated on the front panel LEDs. 44.1 kHz and 48 kHz are supported

When the incoming sample rate frequency is 48 kHz, the video generator uses the Channel Block Start information to lock the Z-preamble to the video frame. When the incoming sample rate frequency is 44.1 kHz, the generator switches to word mode, due to the lack of useful relationship between the AES blocks and the video field at this frequency.

(See Relationship 1PPS, Video, Word and AES)

Video outputs

The video outputs are available on four BNC connectors on the back panel. The outputs are individually buffered, 75 ohms and SMPTE/EBU standard amplitude when terminated. The format is true PAL-8 or NTSC-4.
All components of the video signal are digitally synthesized from one master clock, making the relationship between sync, subcarrier, luminance and chrominance fixed and temperature independent.
Digital filters are employed on the individual components before they are summed to a composite video signal.
A 6th order analog filter is used to remove any digital artifacts that may cause aliasing in digital video equipment.
An undershoot limiter is placed right after the digital filters to prevent synchronization problems. The limiter level is preset to -1.5 IRE below black level.

The following options for the video output can be selected by jumpers on the PCB (*see jumper settings)*

- ✓ Sync only
- ✓ Black burst (sync + subcarrier)
- ✓ Three different luminance filters
- ✓ Three different chrominance filters

A detailed graphical representation of the relevant signals can be found in the appendix.

Word outputs

The Word outputs are available on four BNC connectors on the back panel. The outputs are individually buffered, 75 ohms and TTL level.
The word output frequency follows the chosen sample rate frequency on the front panel, i.e. 44.1 kHz, 48 kHz or 96 kHz.
The rising edge of the word clock is aligned to the AES sub-frame A and the trailing edge is aligned to the AES sub-frame B. Thus a high level indicates left channel and a low level indicates right channel of the audio data.

AES outputs

The AES outputs are available on four XLR connectors on the back panel. The outputs are individually buffered, 110 ohms, transformer balanced and 4.5V PP when terminated.
The AES outputs are intended for synchronization purposes and should ideally be empty of audio data. AES signals are prone to build-up of clock and data jitter in the connected cable, because the format generates a biphase coded signal with a large portion of the frame having identical pulses. Unfortunately this utilizes the memory effect in the cable to produce ghost images of leading and trailing edges. This effect can be minimized by keeping data out of the signal.

However, some commercially available AES receiver chips exhibit PLL lock problems when subjected to a “black” AES signal, producing an unstable and jittery master clock.
The problem is overcome by setting the first eight audio data bits to 1 and the remaining sixteen bits to 0. This gives a DC offset in the audio signal of –90 dBFS or approximately 0.2 mV with reference to +18 dBu.
A standard digital audio input circuit will easily accommodate this DC offset, and the scheme efficiently eliminates the lock problems.

The AES block start (z-preamble) is positioned at the start of the video frame at 48 KHz and 96 kHz output sample frequency.
At 44.1 kHz output sample frequency the sub-frame A (X-preamble) is positioned at the start of the video frame.

AUX1 and AUX2 Outputs

The AUX outputs are configurable outputs. A range of internally generated signals can be brought out on the BNC connectors by setting jumpers on the main board.
AUX1 can be configured to:
CBL (Z-preamble)
Word (X-preamble)
2 x word
64 x word
128 x word
256 x word (pro-tools super clock)

AUX2 can be configured to:
Video output sync
To follow AUX1
To an open solder pad on the PCB.

The solder pad can be connected to various point of interest on the main board
2 independent TTL compatible 75 ohms output buffers are available for these outputs.
The AUX2 output buffer can be set to TTL level or video level.

Alarm output

The alarm output is a floating changeover relay. It is controlled by the input signal detector in the video section. The relay reacts instantly when the input sync is lost and instantly again when the input signal returns.

In case of a lost or an erratic sync, the flywheel will keep the sync running smoothly, but the relay provides the user with a means to set up an alarm system to be warned of problems before they become acute.

Mechanical and electrical specifications:

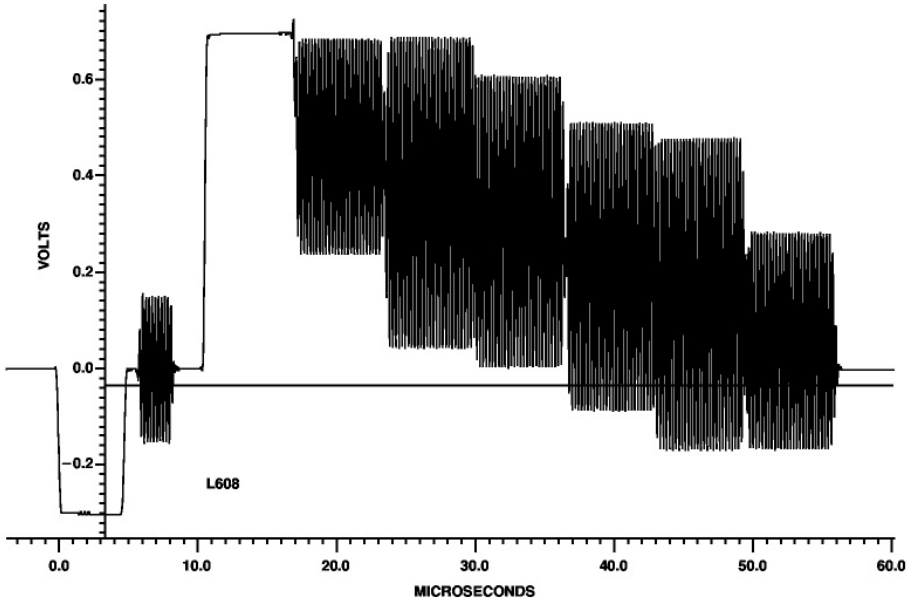
Dimensions : Width 19 inch, height 1U (44 mm), depth 320 mm
Weight : 5.5 kg
Power requirements : 180 - 240 VAC 50 Hz, 10 Watts (EU Version)
: 80 – 130 VAC 60 Hz, 10 Watts (USA Version)

Reference Inputs : Composite PAL/NTSC/SECAM Video, balanced, unterminated 1 kOhms, 0.1 -3.0 V PP
: 10 MHz clock, 10 kOhms, TTL level
: 1PPS clock, 10 kOhms, TTL level
: 2.048 MHz clock, 10 kOhms, TTL level
: Optional 2 Mbit E1 CCITT G703/G704 transformer balanced input, 75 Ohms
: SDIF-2 word clock, 10 kOhms, TTL level
: AES balanced 110 ohms 0.2 -5.0 V PP

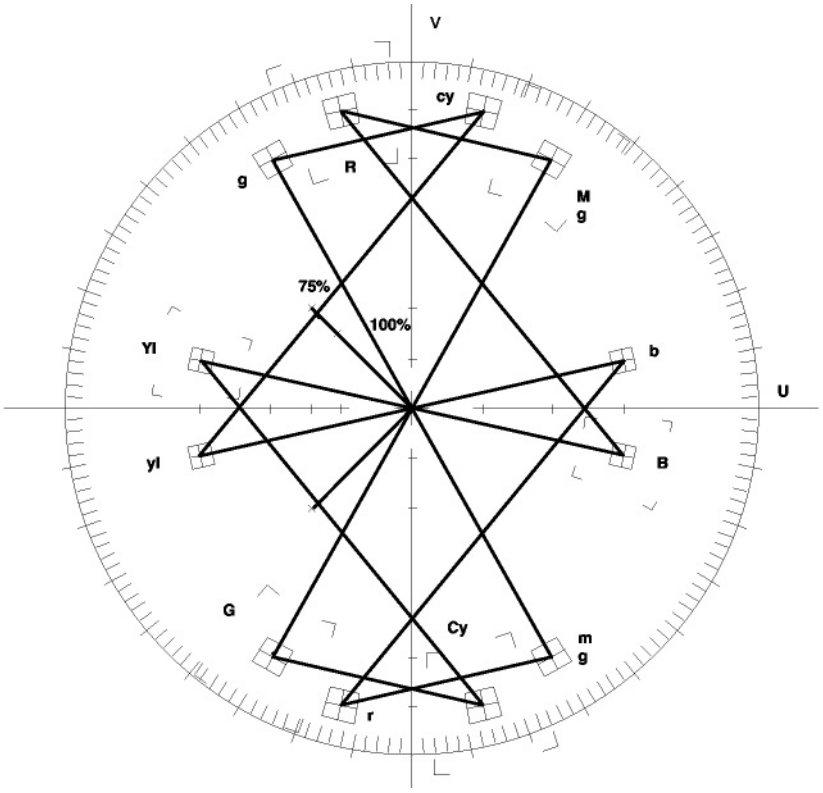
Outputs : Composite Video 75 Ohms SMPTE/EBU level
PAL (B) 25 Hz, 625 lines interlaced or NTSC 29.97 Hz, 525 lines interlaced
: AES11 transformer balanced 110 ohms, 4.5 V PP into 110 Ohms
: SDIF-2 word clock, 75 Ohms, TTL level
: AUX outputs, configurable, 75 Ohms, TTL level/300 mV video level
: No-sync alarm relay, SPDT 100V 0.5A

Stability/accuracy : Oven crystal accuracy 0.2 ppm/25 deg. C, stability +/-0.3 ppm 0/+50 deg. C
: Hue accuracy > 0.5 degrees
: SC-H phase accuracy > 1 degrees
: PLL capture range +/-30 ppm.
: PLL jitter video outputs < 1 nsec
: PLL jitter AES outputs < 1 nsec
: PLL jitter Word outputs < 1 nsec
: PLL wander video frame input/video frame output < 2 nsec
: PLL wander 10 MHz input/video output < 1 nsec
: PLL wander 2.048 MHz input/video output < 1nsec
: PLL wander word input/video output < 1nsec
: PLL wander AES input/video output < 1nsec

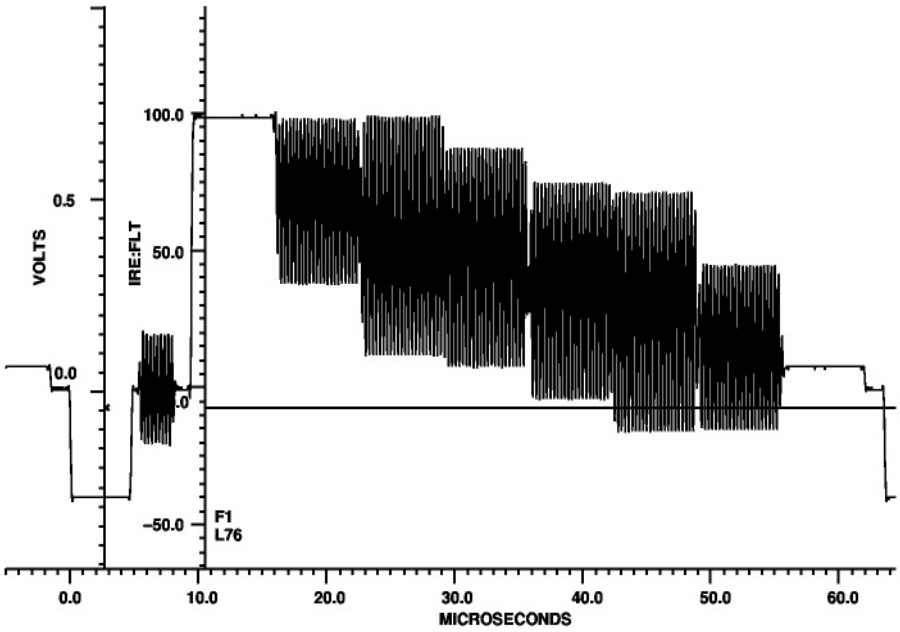
Appendix



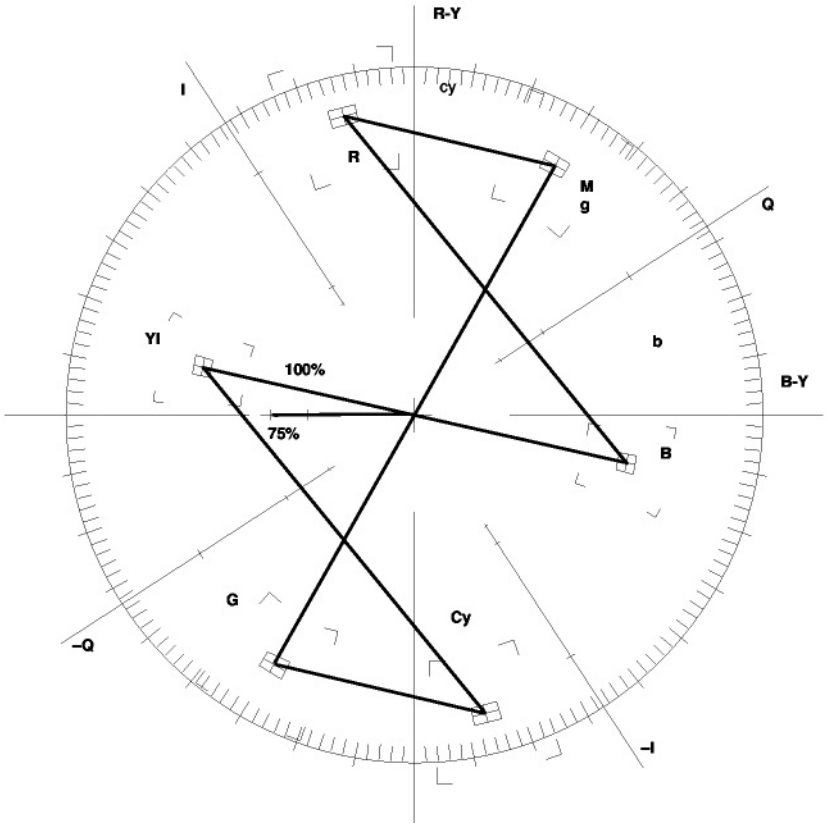
100/75 EBU PAL Colorbar



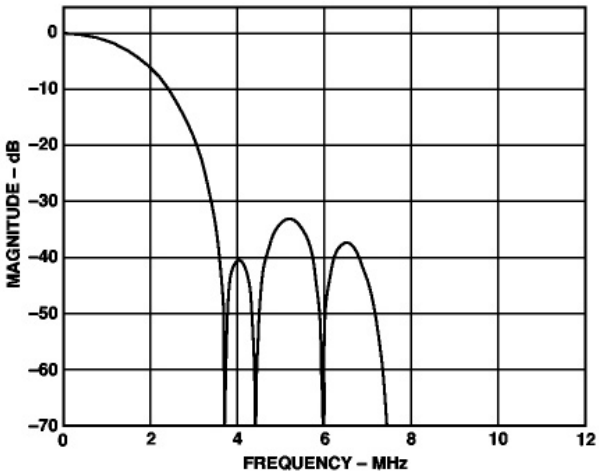
PAL vector plot



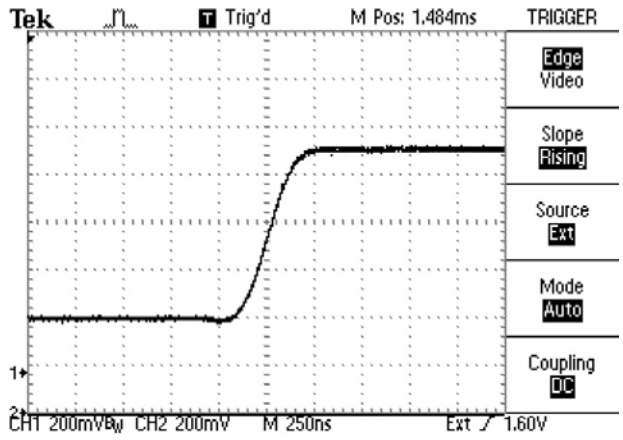
100/7,5/75/7,5 NTSC Colorbar



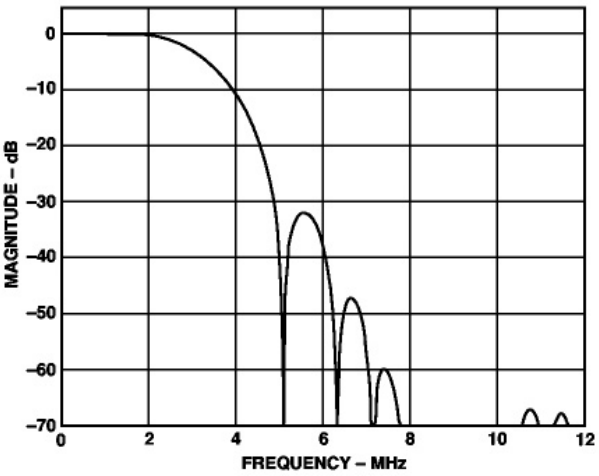
NTSC vector plot



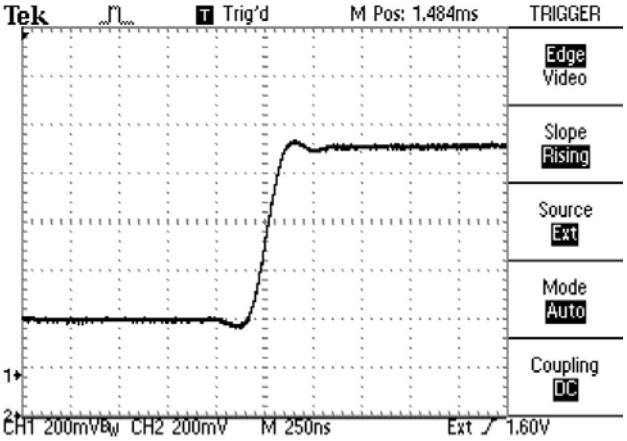
Luminance filter 1, frequency response



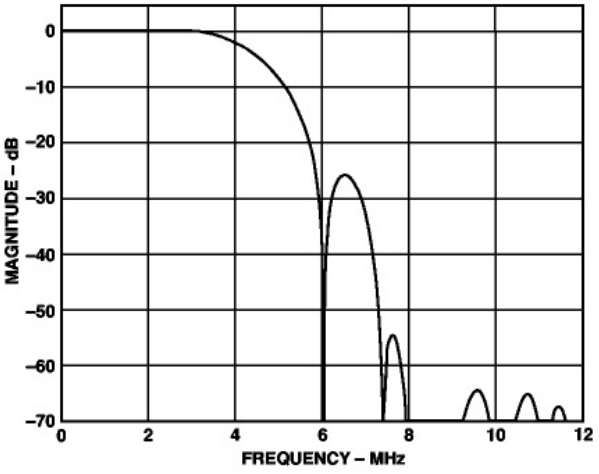
Luminance filter 1, step from black to white level



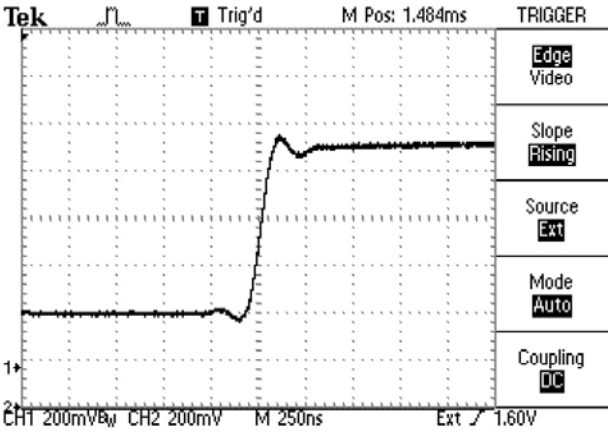
Luminance filter 2, frequency response



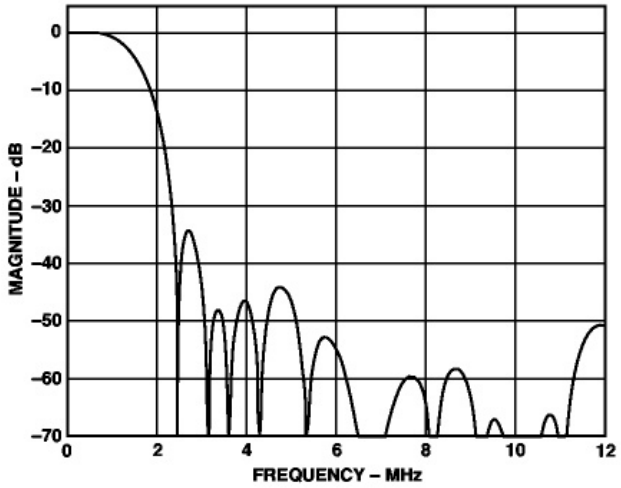
Luminance filter 2, step from black to white level



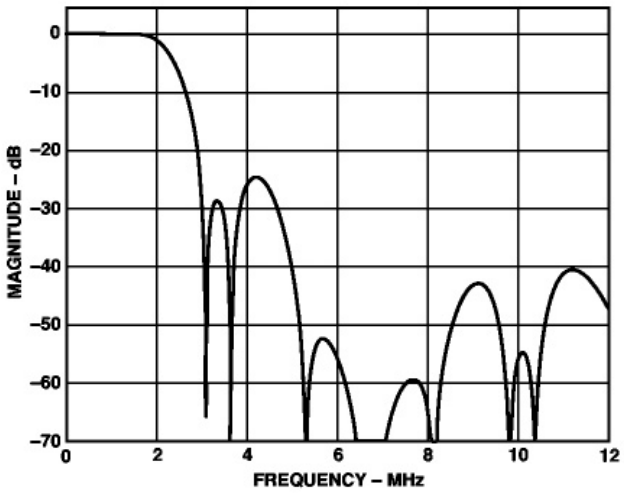
Luminance filter 3, frequency response



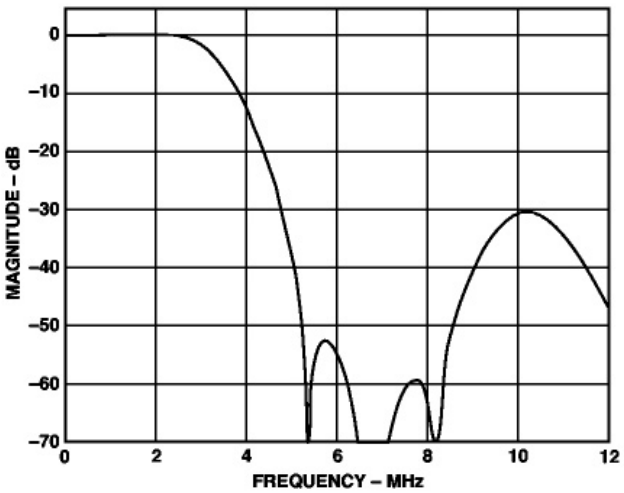
Luminance filter 3, step from black to white level



Chrominance filter 1, frequency response



Chrominance filter 2, frequency response



Chrominance filter 3, frequency response

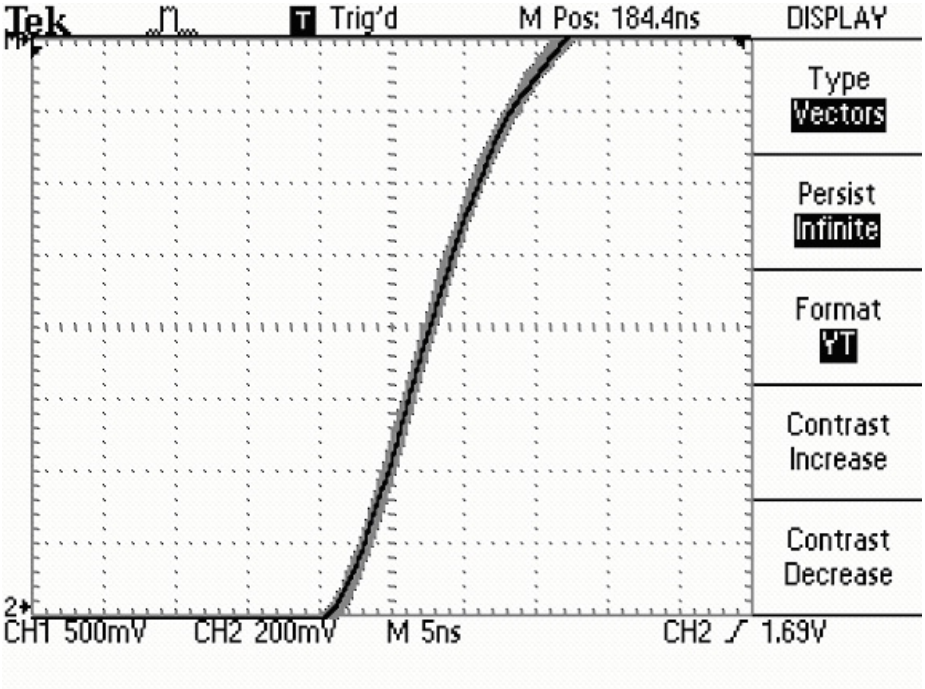
PLL Jitter and Wander measurements

The following measurements was performed by locking the ASD8V to various incoming sync sources and measuring the resulting jitter and wander specifications at the outputs. The output signal was read out by a digital storage oscilloscope while triggering on the incoming sync source.
The oscilloscope was set to infinite persistence, thus the grayed out area represent the total sum of *jitter+wander* accumulated over the time of the measurement.

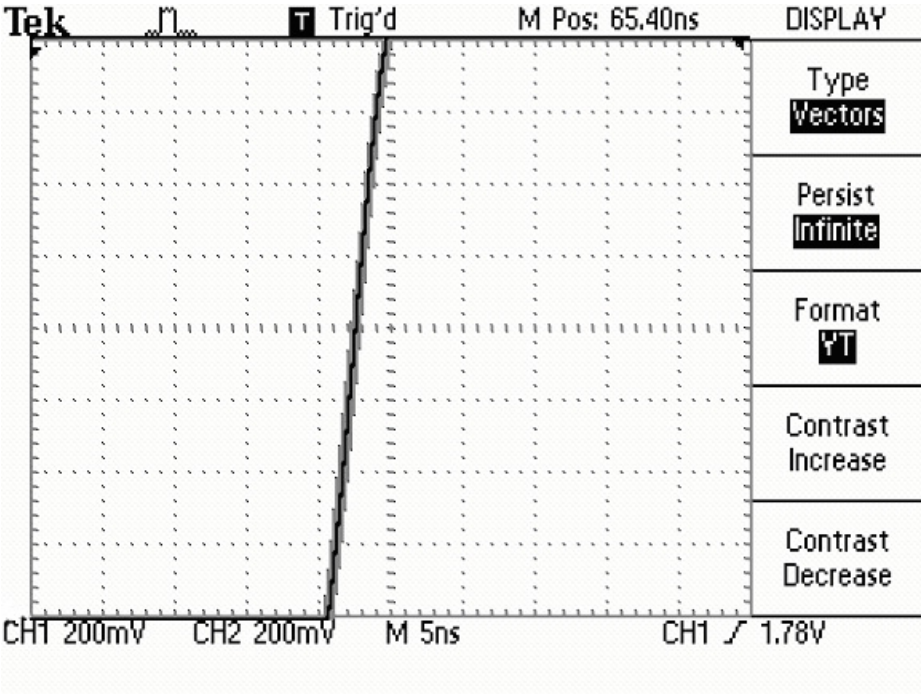
The following conditions were applied:

The ASD8V was allowed to warm up for 15 minutes to enable the master oscillator to fully stabilize.
The PLL was allowed to maintain lock for 1 minute in order to settle before the measurement started.
The measurement time was 10 minutes for each graph.
The measurement bandwidth was DC – 60 MHz

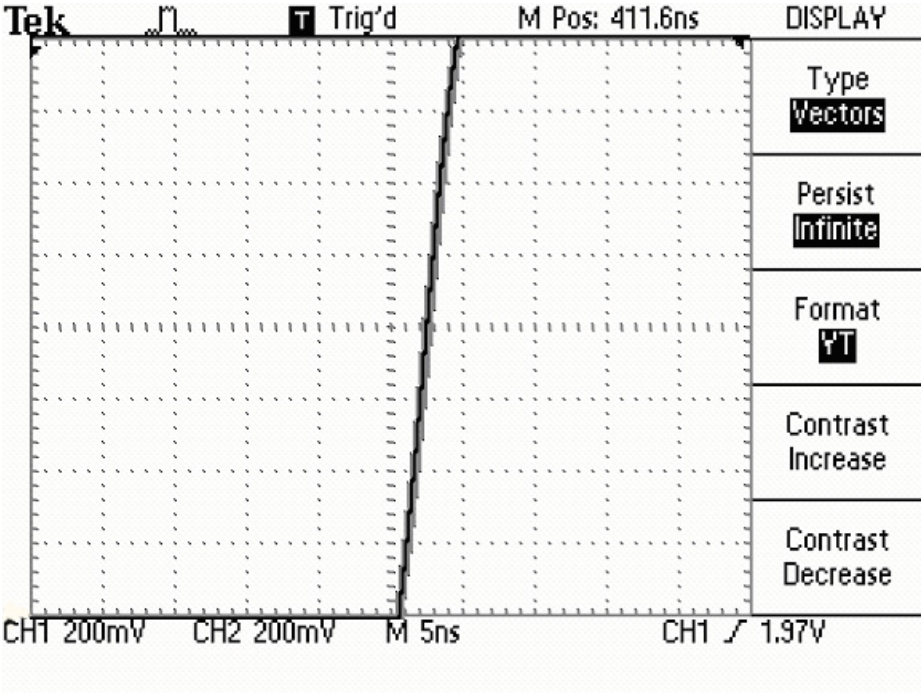
The actual horizontal position of the graph is not relevant for the measurement. It was simply chosen to be at a place with a clear view. The results can be seen on the following scope screen dumps.
Jitter+wander is less than 1.5 nsec for video/video and less than 1 nsec for all other configurations.



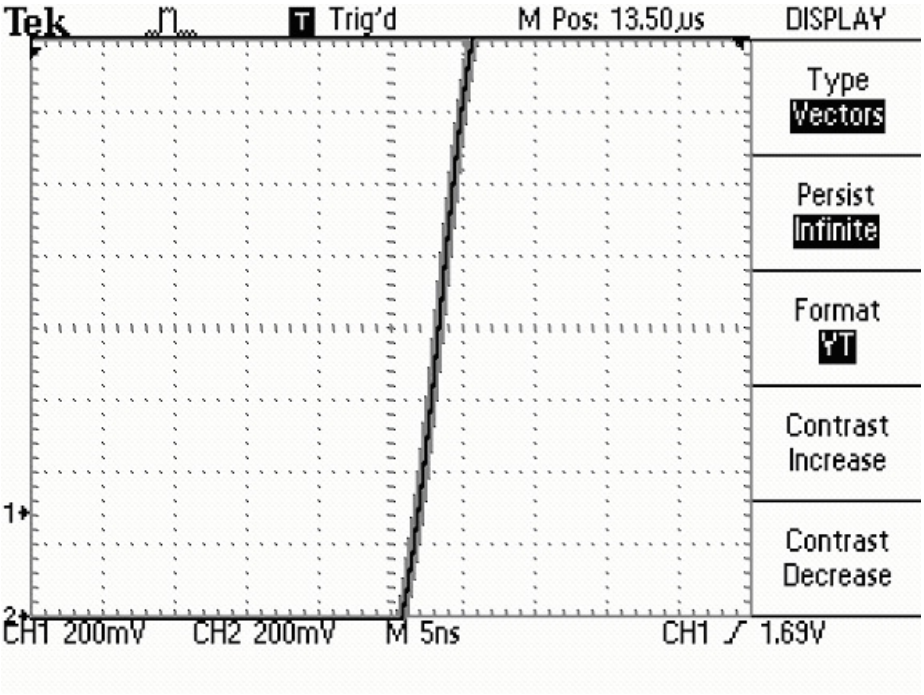
PLL Jitter and Wander. Video in/ Video out



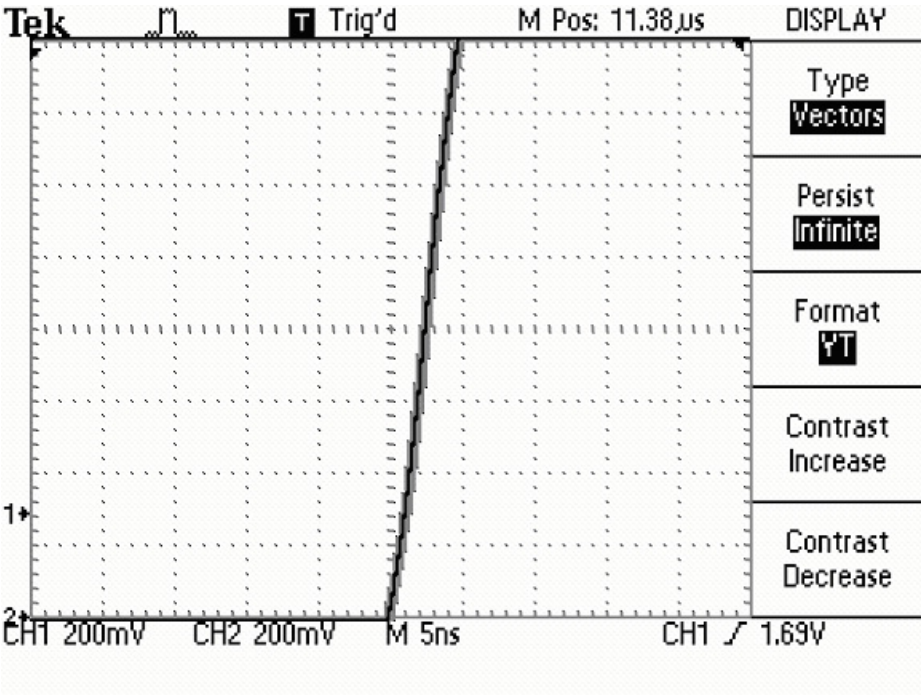
PLL Jitter and Wander. 10 MHz in/ Video out



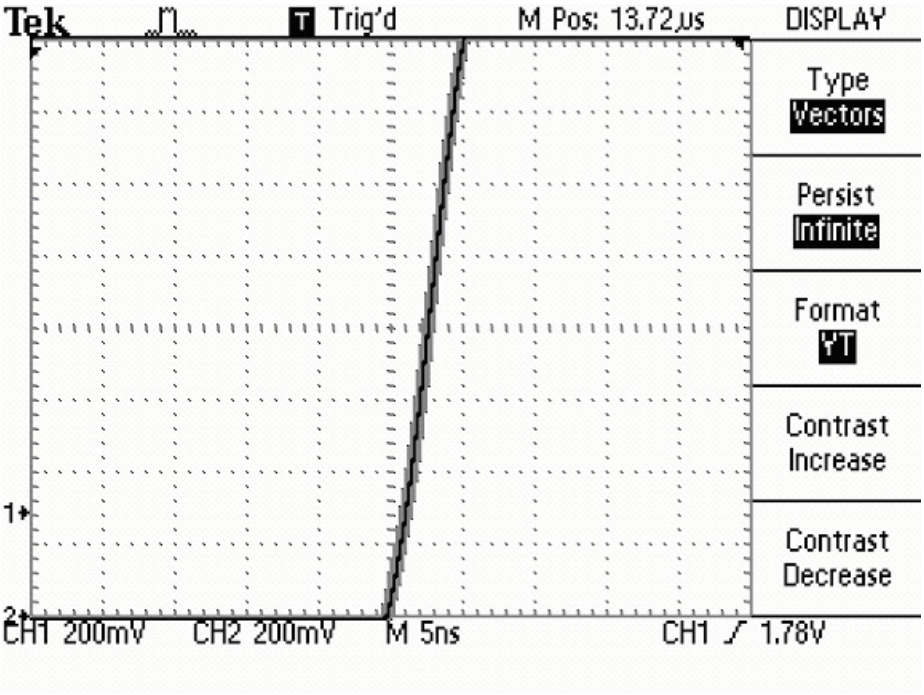
PLL Jitter and Wander. 2.048 MHz in/ Video out



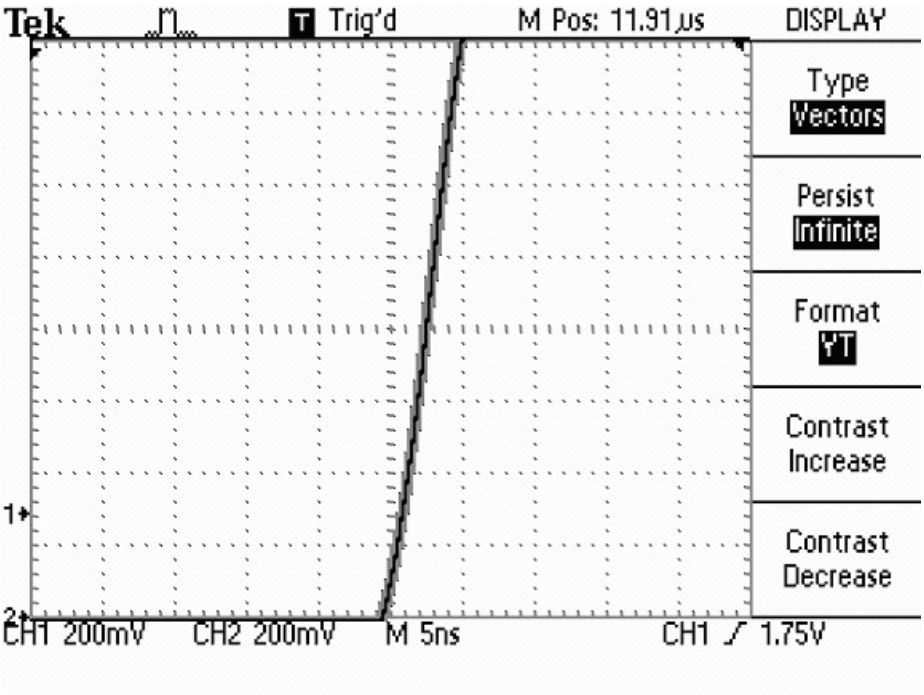
PLL Jitter and Wander. AES 48 kHz in/ Video out



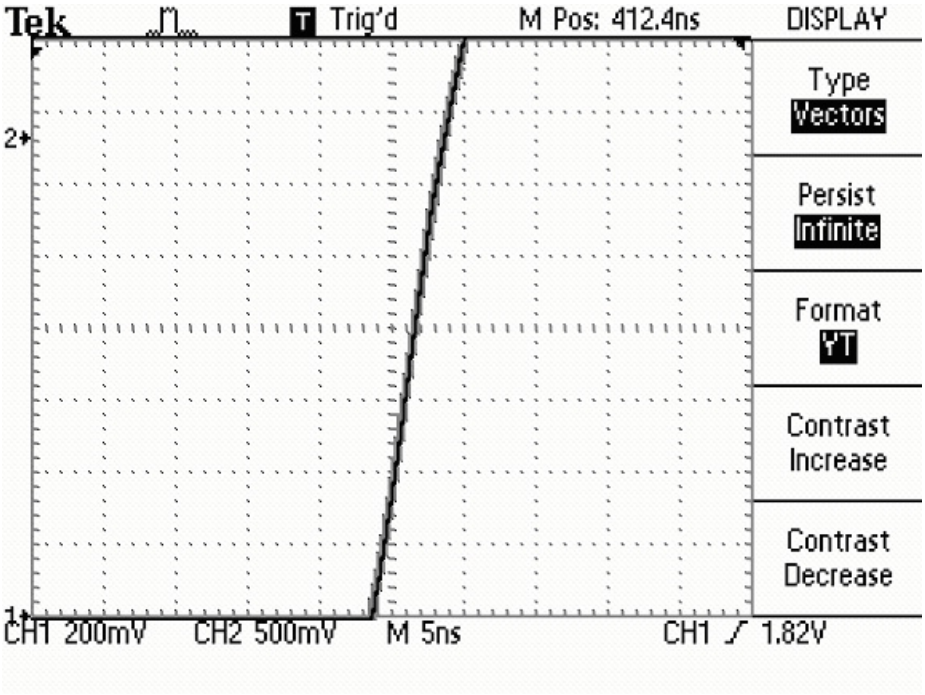
PLL Jitter and Wander. AES 44.1 kHz in/ Video out



PLL Jitter and Wander. Word 48 kHz in/ Video out



PLL Jitter and Wander. Word 44.1 kHz in/ Video out



PLL Jitter and Wander. Video out/AES 48 out

Relationship 1PPS, Video, Word and AES