

VQTS-100

Video Quality Test System

Version 1.1

User Manual



VQTS-100

Video Quality Test System

by VideoQ Inc

Complete self-contained unit combining hardware and software tools. Comprised of Test Signal Generator Module, Video Capture Module and VQMA - fully automated Software Video Analyzer to measure the quality of composite video signal.

Ideal tool for composite video link facilities and video development labs, instantly revealing your video system performance.



VQTS-100 User Manual

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Author: Victor Steinberg

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Revision History

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1 Introduction and Overview

VQTS-100 is an advanced Video Test System that consists of a calibrated test signal generator, high precision video capture device and sophisticated video performance analyzer.

VQTS-100 is housed in the 4U case combining hardware and software modules of a PC running Windows XP OS. This case can be rack-mounted or used as a stand-alone pedestal unit.



VQTS-100 is equipped with baseband analog NTSC/PAL CVBS video output and baseband analog NTSC/PAL CVBS video input.

This model does not support input and output formats other than CVBS. These formats, such as HDMI or component YPrPb are reserved for other VQTS family products.

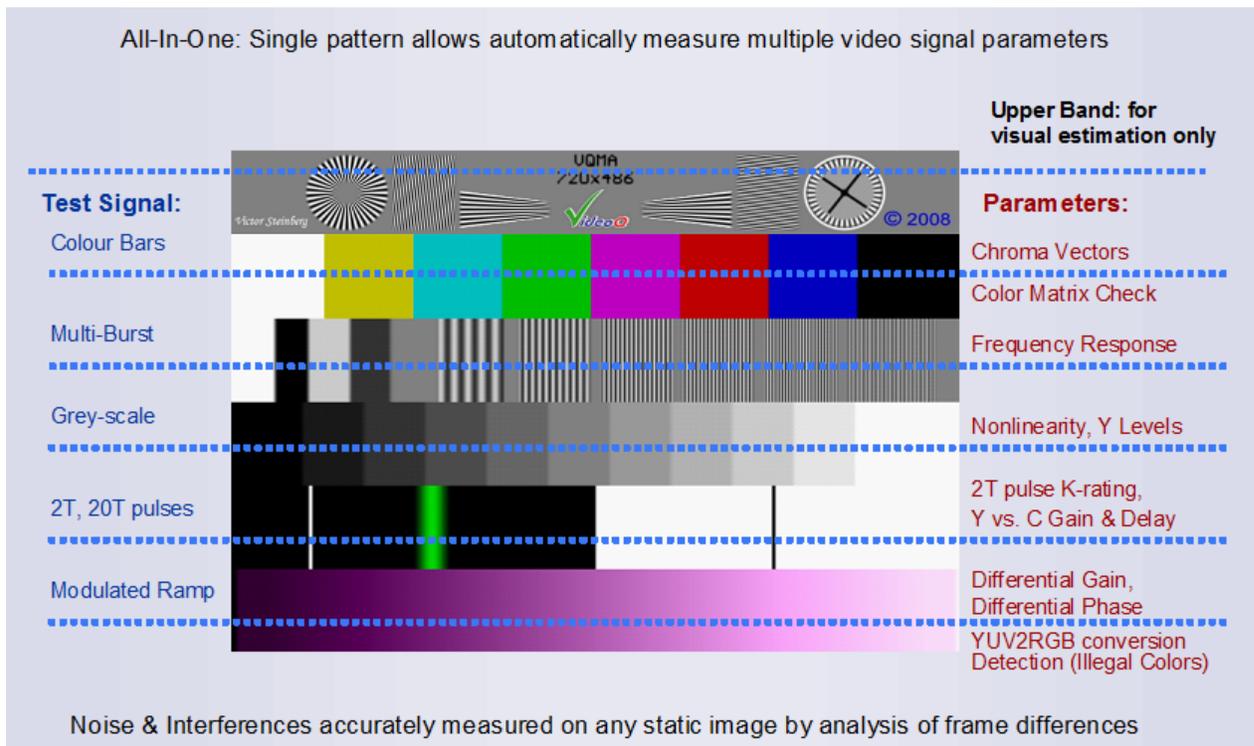
VQTS-100 is suitable for testing both simple single stage CVBS-to-CVBS links and complex multi-stage CVBS video links, which may include RF modems and/or digital codecs. It is a quite robust system allowing for significant distortions of the incoming signal, such as wrong video levels, wrong timing positions of the CVBS signal components or high levels of noise and/or interferences.

VQTS-100 automated measurement capabilities rely on advanced algorithms of built-in VQMA software analyzer. More details about VQMA Video Quality Measurement Software can be found in a separate 'VQMA User Manual'.

If necessary, the built-in VQMA tool can be used for off-line analysis of uncompressed video files containing proprietary VQMA matrix test pattern. These .AVI file are created automatically by VQTS system itself or they can be imported from the outside, e.g. received via LAN/WAN FTP transfer from another VQTS system or even from third party video capture system, hardware or software processor.

VQTS-100 system relies on the unique **VQMA Test Matrix Pattern**.

This test signal is permanently present on VQTS-100 CVBS video output which should feed the device or system under the test. For this purpose the corresponding video file is permanently played out by built-in hardware module. The output of the device or system under the test should be routed to the VQTS-100 CVBS video input.



The spinning wheel in the upper right part of the test pattern video image advances one dial division every second. This provides useful visual hint indicating that the video link is not broken (i.e. image is not frozen). This component of the test pattern does not affect any video quality measurement procedures or measurements results.

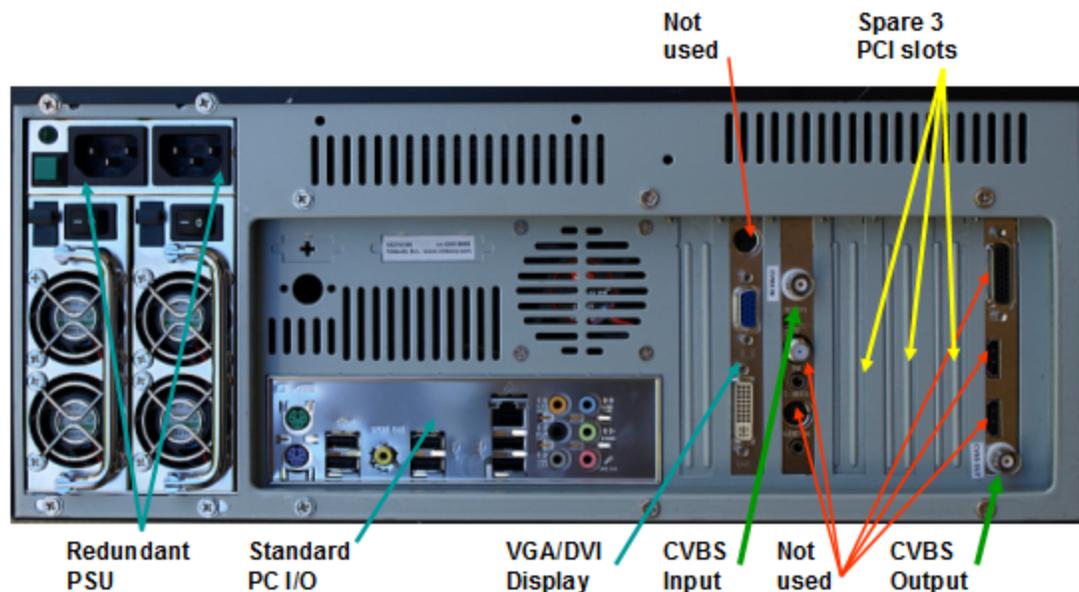
2 Hardware and Software Installation

The VQTS-100 is a turn-key system, supplied complete with pre-installed hardware and software modules. No additional software installation is required for normal VQTS-100 system operation.

Install the VQTS-100 either stand-alone or on the 19" rack shelf.



Installation of additional hardware or software modules (others than supplied explicitly by VideoQ) is permitted, but VideoQ will not take any responsibility for possible hardware/software failures or conflicts as a result of thereof, thus potentially inhibiting normal VQTS-100 system operation.



Connect both power feeds (recommended) or single feed (acceptable, but hot back-up will be not available).

Connect all standard PC I/O devices: display, keyboard, mouse. If necessary, connect network cable (optional).

Install VQTS-100 copy-protection dongle into any available USB slot.

VQMA is a copy protected program using uniquely encrypted USB dongle, matched with the copy of your executable as installed. This dongle must be inserted into USB port of the VQTS PC where VQMA is installed whenever the VQMA.EXE is running. In case of loss or damage of this USB dongle, VideoQ reserve the right to revoke the license.



Please note that when the dongle is not connected, the protected application will stop running. If you purchased several VQTS-100 systems the dongles and VQTS-100 cases are mutually interchangeable within the user's premises. The VQTS dongles will not work with the VQMA software executables purchased separately from VQTS-100 systems. VQTS dongles installation on networked computer system (LAN or WAN) is not possible.

System is now ready for powering-on.

Open the latched left front door and switch on power by momentarily pressing on power button.

Note that keeping this button pressed for few seconds initiate system shut-down.

If VQTS-100 remote operation controls via network are required, then please install, enable and use ubiquitous software tools, such as Microsoft Windows Remote Desktop or similar.

It is recommended to use only **local controls and local hard drive folders**; it is desirable to limit network operations to **copying/archiving** the resulting files **after** their creation

3 Features and Parameters

Main Features:

- Complete self-contained Video Quality Test System to measure the objective quality of composite video signal
- 4U case with hardware and software modules of a PC running Windows XP OS
- Comprised of the following modules:
 - **Test Signal Generator**
 - **Video Capture Module**
 - **VQMA** - Software Video Analyzer
- Single click launches complete test procedure
- Video data captured into .AVI file container for expedient quality test
- Optional .AVI files archiving for further detailed analysis
- Nearly instant (few seconds) automated measurement of the video signal performance
- Short Test Report data appended to machine-readable log file with time and date stamps
- Off-line Windows GUI Mode Analysis of captured video files with optional print-out of detailed report.
- Customizable .INI files allow editing of file locations and video quality tolerance values

The following parameters are measured and/or displayed :

- Black and White levels
- Grey Scale pattern display
- Differential Gain and Phase
- Frequency Response on standard multi-burst frequencies
- K-rating on 2T pulse
- Y vs. C, Gain and Delay on 12.5/20T pulse
- Chroma Vectors display (Vectorscope) with +/-2.5% zones
- Weighted and Unweighted SNR for Y and UV
- Noise Spectrum display

4 Operation

There are three major modes of VQTS-100 system operation:

- **Preview**
- **Automated Measurement**
- **Off-line Analysis**

The VQTS-100 system modules can be launched at any moment in any one of these three modes.

Moreover, any two or even all three modes can be used in parallel, e.g. automated measurement function (with log file appended by the updated results) can be performed whilst examining some .AVI files created earlier.

VQTS-100 system desktop contains the following control icons:



1. "VQTS Test Generator" - restarts matrix test pattern video play-out
2. "VQTS Input Preview" - enables the input video monitor window
3. "VQTS Auto Measurement" - starts the complete test procedure in the background
4. "VQMA Off-Line Analyzer" - launches the off-line detailed analysis tool
5. "VQTS Log Viewer" - opens the VQTS-Log.txt file in the text viewer/editor

VQTS Test Generator

Normally Test Generator starts automatically on a system power-up. It is highly recommended to keep Test Generator running permanently in a "loop" mode thus providing uninterrupted video output.

Note that the hardware play-out module continues to output last (frozen) video frame even after shut down of the Test Generator software module, but the spinning wheel in the upper right part of the test pattern video image will not move.

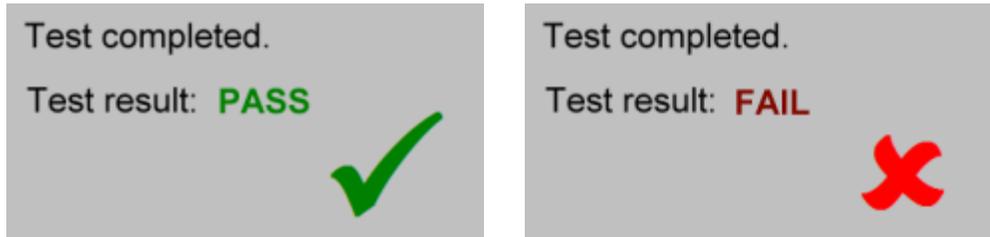
VQTS Preview Window

Preview mode is especially useful for checking the CVBS input signal presence and rough CVBS input quality estimation, e.g. during video link set-up or maintenance works.

Input Preview and Automated Measurements modes presume the presence of test pattern signal on the VQTS-100 system CVBS output, which is normally the case. If by any reason, the video play-out module (Test Generator) is not running, then please re-launch it.

VQTS Auto Measurement

Launch automated test by clicking on 'VQTS Auto Measurement' icon. The Preview Window showing input signal should appear for few seconds. Results of the automated test are available in approximately 5 seconds. The result summary (PASS or FAIL) will be shown for few seconds in a splash box message:



At the same time full list of the current measurement results will be created and automatically appended to the machine-readable VQTS-Log.txt file.

PASS or FAIL here means that the signal quality does or does not match *all* target tolerances specified in VQNTSC.INI or VQPAL.INI file. Mismatch of just one parameter, e.g. white level, results in FAIL result.

For more details about usage and editing of .INI files see separate 'VQMA User Manual'.

PASS or FAIL message appears on-screen only if the full sequence of test procedures was *successfully accomplished*.

In some cases VQTS system can not complete the test procedure, for example if input signal is very unstable or any one of video cables is disconnected. In such case the corresponding warning text message with date and time stamp is automatically appended to the log file. In this case it makes sense to re-check

the system set-up using Preview Window until you see normal dynamic pattern with moving spinning wheel.

VQMA Off-line Analyzer

'VQMA' icon serves for off-line analysis of .AVI files captured earlier, so for this off-line mode the Generator status and input signal presence do not matter.

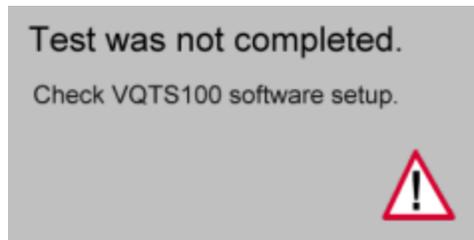
In this mode it is possible to view more details about particular test records and produce detailed report documents with waveform diagrams, noise spectrum diagram, etc.

The multi-page report can be printed on any standard printer installed in Windows Control Panel; it is recommended to use pre-installed 'PDF Factory' printer to produce reports in PDF format.

For more details about the VQMA Analyzer operation and .AVI files formats see "VQMA User Manual".

Misc

1. The VQTS-100 software modules may be suspended from running at all by user intervention, but these modules should be resumed for normal operation. This may be the case if 100% of Windows OS resources are required to run third party modules, e.g. for set-up or diagnostic operations. ***Complete shut-down of all VQTS software modules should be done with caution and by advanced users only.***
2. In case of serious problems with VQTS software setup, for example if some executable files are missing or damaged, the following warning message will appear on the screen for few seconds:



Same message will appear if copy protection USB dongle is missing, which prevents the normal execution of VQMA program.

3. Note, that in case of CVBS input signal absence, e.g. because of broken or disconnected video cable, the VQTS-100 system can still proceed with the test. The preview window will go black, showing FAIL results, thus such situations are easily diagnosed.
4. If quick self-diagnostic 'health check' is required, just connect VQTS-100 CVBS output with CVBS input by short coaxial 75 Ohm cable and launch VQTS-Auto Measurements process. The preview window will display the VQMA test pattern and PASS test result should show.

5 Configuration and Customization

VQTS-100 INI Files

Customizable .INI files allow editing of file locations, system parameters and the tolerance values used.

There are three .INI files:

1. VQTS.INI
2. VQNTSC.INI
3. VQPAL.INI

All three files are located in the "VQTS" folder, together with all executables.

Configuration management of the whole VQTS-100 system is performed via direct editing of the **VQTS.INI** file.

VQTS.INI is a text file pointing to customizable folders and file locations. It also contains file name of test pattern video played-out by Test Generator, NTSC/PAL switch and some other parameters.

It is possible to change the location of captured video files, video standard (NTSC/PAL), location and name of the log file. It is recommended to select only *local hard drive folders*; network operations should be *limited to copying/archiving* the resulting files *after* their creation.

VQTS.INI file can be edited using any text editor, such as Notepad., but this should be done with caution and by advanced users only.

Improper editing of this file may result in complete system failure; it is advisable to keep a backup copy of the original file.

VQNTSC.INI and **VQPAL.INI** files contain all tolerance (target) values used by VQMA analyzer to do quality check decisions, i.e. raising the "pass/fail" flags for particular video parameters.

VQMA automatically detects NTSC or PAL .AVI video file and selects the appropriate .INI file.

The .INI files ***must be present*** in the program folder, they are editable, so the users can input their customized ***tolerance values*** for any parameter.

If these .INI files are not found in the program folder, then they are created automatically by VQMA.EXE with the default tolerance values.

VQNTSC.INI and VQPAL.INI ***file names*** are ***reserved and cannot be modified***.

The content of the .INI files can be edited using any text editor (like Notepad) to apply the tolerance values more appropriate for the particular device or system under test. It should be done with caution because the ***list of parameters*** and ***units of measurement*** codes ***should not be modified***.

Only actual *numerical values*, e.g. frequency response drop for some particular frequency can be amended. For example, the MIN tolerance for 3 MHz burst can be changed from -1 dB (default) to -3 dB.

It is recommended to store customized .INI files under the names which are different from the reserved ones, e.g. MY_NTSC.INI. To use these customized .INI file simply rename a copy of the selected file MY_NTSC.INI to VQNTSC.INI, overwriting the default file.

It is also advisable to keep a backup copies of the original files, thus allowing to revert to the default values if necessary.

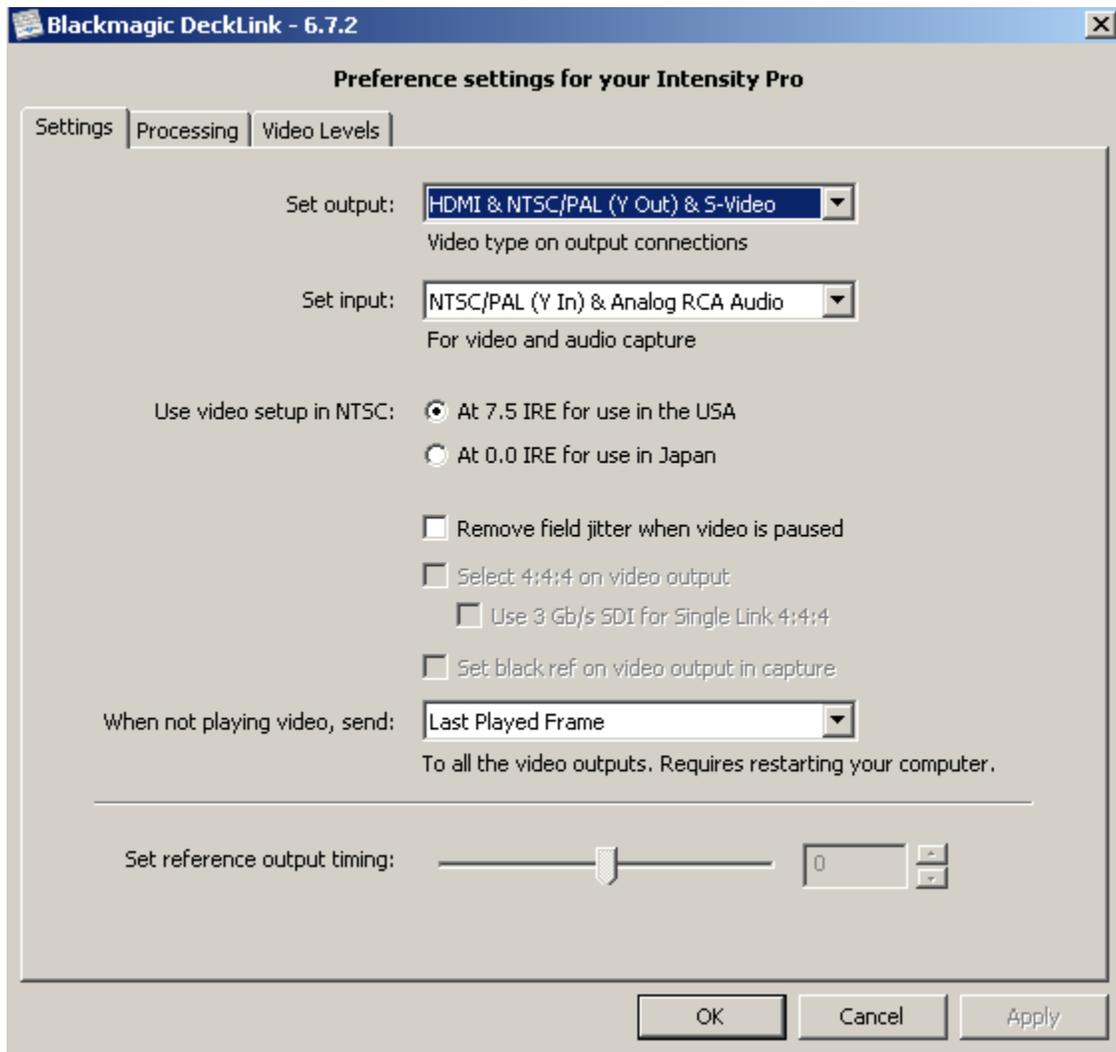
The process of replacement of the .INI files can be automated by usage of conventional batch files or scripts.

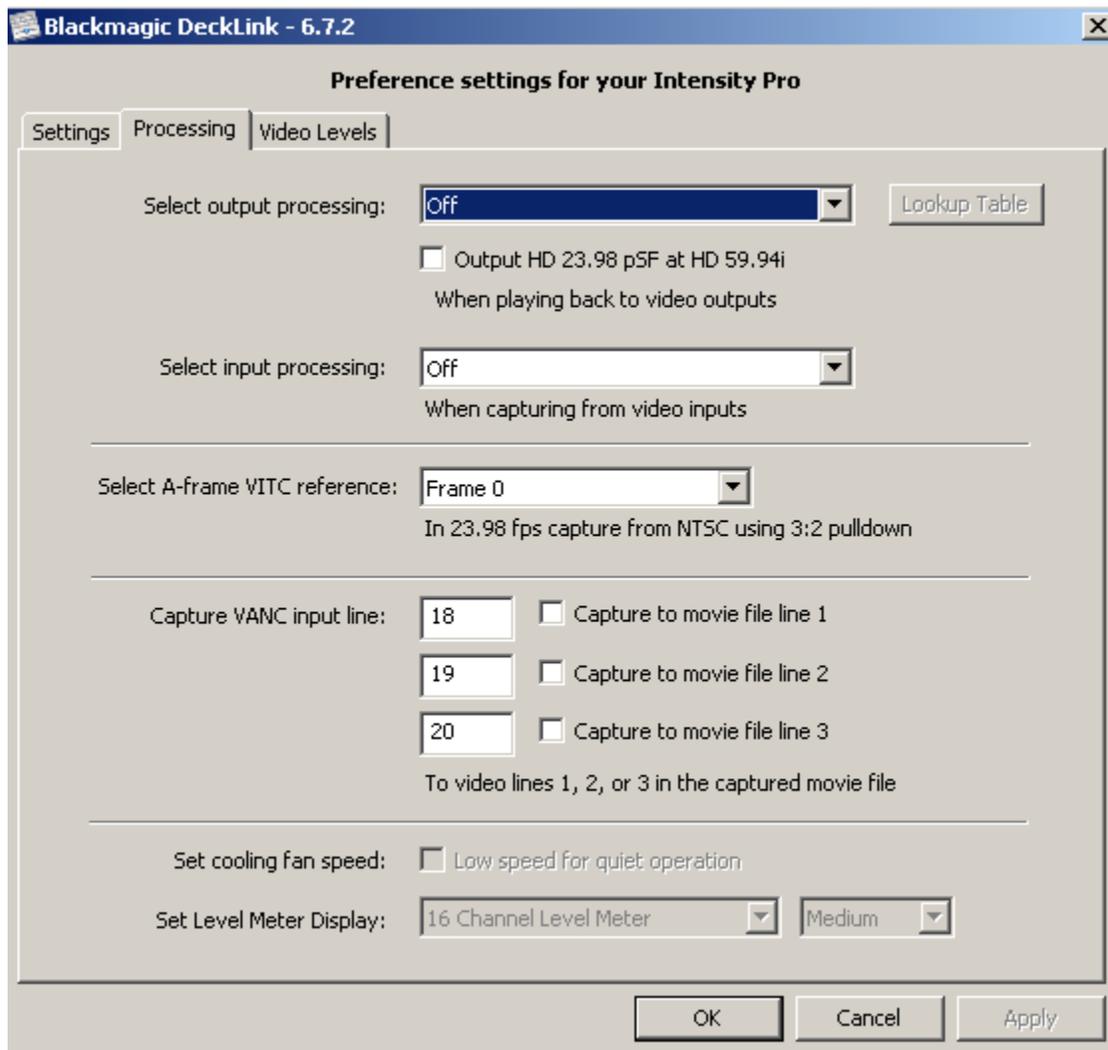
For more details about the .INI files see "VQMA User Manual".

Test Generator Hardware Configuration

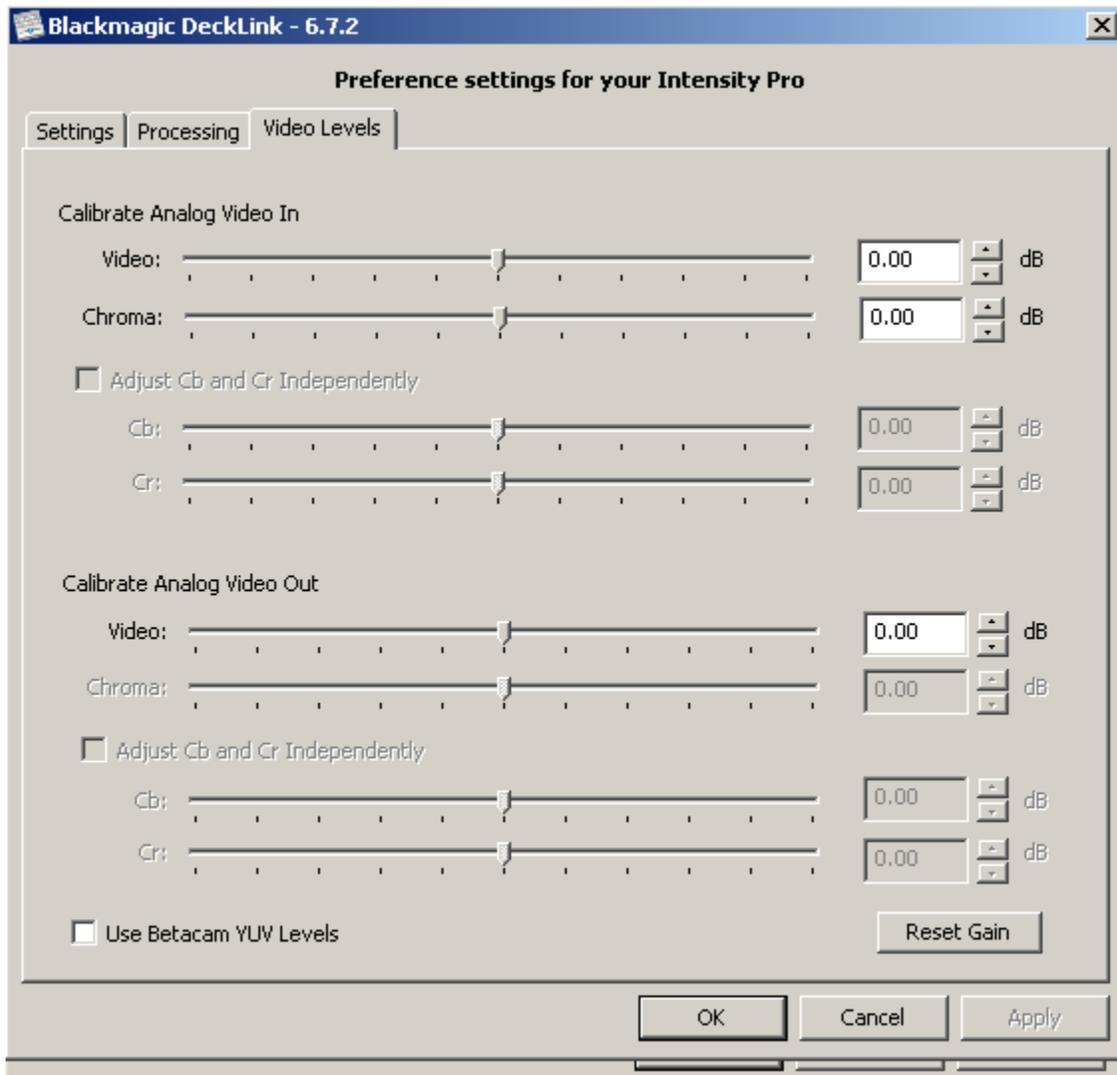
Test Generator hardware is supplied pre-configured and its reconfiguration normally not needed. However, in the unlikely case of loss of the hardware control parameters they can be restored using the "DeckLink Control Panel" utility located in "Start Menu\Programs\VideoQ\VQTS" folder.

The correct settings are shown on the following screenshots:





'Video Levels' tab parameters serve for DeckLink capture function, which is not used by VQTS-100 system, so the following screenshot is for information only:



6 Specifications

- 4U case:
 - Weight: 12 kg
 - Dimensions (D x W x H): 522 mm x 430 mm x 176 mm (20.5" x 16.9" x 6.9")
 - Detachable handles for easy carrying (installed)
 - Detachable rack mount ears (supplied)
- PSU:
Redundant x2, 400 Watt, 115-230 V, 50/60 Hz
- Easy swap 2 x 80 mm rear fans and 1 x 120 mm front fan
- PCI expansions slots x 3
- USB ports x 8
- Intel Pentium Dual Core 2.2 GHz
- 2 GB RAM
- 250 GB HDD
- DL +/-RW DVD Drive
- Video output:
NTSC/PAL CVBS, 1Vpp on 75 Ohm, BNC x1
- Video input:
NTSC/PAL CVBS, 1Vpp on 75 Ohm, BNC x1

7 Terms and Abbreviations

Term	Explanation
AVI	Audio Video Interleaved (File Format)
C	Chrominance (Chroma) Video Signal
CVBS	Color, Video, Blanking and Sync (Composite Video Signal)
DVD	Digital Versatile Disk (Disk Format)
MP2	MPEG-2 (Video Compression Format)
MP4	MPEG-4 (Video Compression Format)
NTSC	National Television Systems Committee (also a TV Standard name)
PAL	Phase Alternate Lines (TV Standard)
SNR	Signal-to-Noise Ratio
UV	Color Difference Video Signals: U (CB) & V (CR)
Y	Luminance Video Signal
YUV	Digital Component 4:2:2 Multiplex (also a File Format)

VideoQ Inc

