



QCBOX USER MANUAL

This guide explains how to use the basic functionalities of the **QCBox** v 1.2.



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Preface

Dear **PlayBox** customer,

Thank you for purchasing our product! We would like to assure you that you have chosen the most cost-effective and versatile TV automation system on the market. As always, we are trying to stay close to our customers' needs, making sure they all receive adequate support and satisfaction. Your opinion about our product is an exceptionally valuable source of information for us. The ease of working with the **PlayBox** products results mainly from the suggestions and comments of our current respected customers.

This manual is structured into several sequential chapters, each aiming to ease the installation, fine tuning, and use of our products. We hope that you will enjoy working with it, and we are anxiously looking forward to receiving your feedback.

Please, send your questions, suggestions, and assistance requests to:

support@playboxtechnology.com

General feedback:

info@playboxtechnology.com



Style Conventions

- File names, software, documents or terms are written in *italics*
 - The data is written in the *settings.ini* file.
 - The file is located in C:\Program Files\DMT**AirBox**
 - For further information read *Shortcuts* reference book.
 - The VTR is controlled via *RS-422*.
- Direct quotations from the computer screen are presented as follows:
 - **Menu Items and commands**
 - **Tab/Page names**
 - **Column names (i.e. in a playlist or another grid)**
 - *Field names, check boxes*
 - **Buttons**
 - Screen readings are written in [square brackets]
 - **The keyboard keys are enclosed in <> signs**
 - *Terms are defined in the Glossary at the end of the manual*
- The arrows, used in the setting procedures mean as follows:
 - → A menu item follows;
 - ⇨ A page(tab) name follows;
 - → A field name, a check box name, or a value name follows.

Except for arrows, you can distinguish between the relevant menu categories also by the styles, listed above.



GETTING STARTED

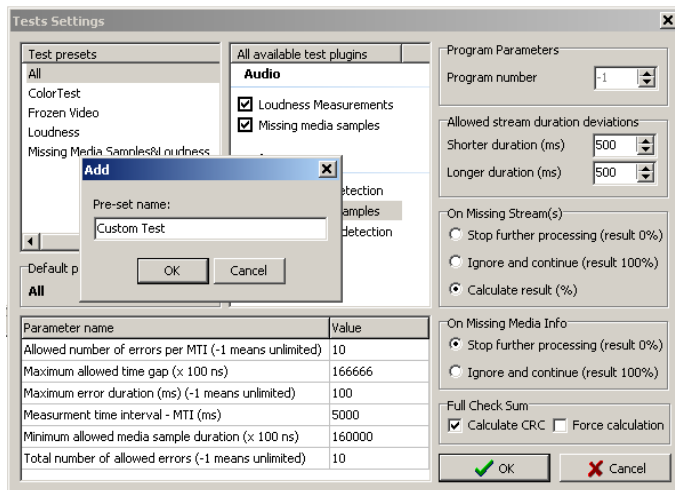
QCBox is a quality control tool, intended to guarantee the successful playout of media files in **AirBox**. **QCBox** checks directories, playlists or sets of files. Content verifications include loudness measurement and/or detection of missing audio/video samples. **QCBox** stores quality data about each checked media file to an ***.mtd** file. **AirBox** can play or skip a clip depending on that quality data and the user settings.

QUICK START

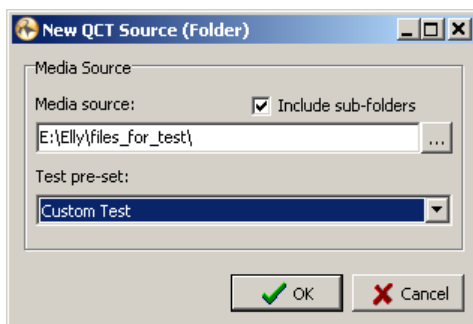
1. Launch **QCBox**.
2. Go to **Settings > Test Presets**. The **Tests Settings** dialog will open.
3. In the Test settings dialog, select a predefined test from the **Test presets** field

OR

Define a custom test preset: right-click somewhere in the **Test presets** field, select **Add**, and enter a name to the new preset. Select the test plug-in(s), which will be used to verify the content from the **All available test plugins lists** and click **OK**.



4. On the **File** menu, select a **New QCT source**. The source can be a **Folder**, an **AirBox playlist**, a **Set of files**, or a **Text file**.
5. In the **New QCT source** dialog that follows, specify a **Media Source** location. This is the location where the media files for tests are stored.



6. Select a **Test preset** from the drop-down list and click **OK**. All the files from the specified location will be listed in the **Files set** area of the main **QCBox** window.
7. Go to **Tests > Start** to start the test procedure.

Congratulations! You have just started **QCBox**!



USER INTERFACE

The user interface of **QCBox** is simple and easy to use. It consists of a [Menu bar](#), a [Toolbar](#), a [Media files list](#) and a [Test Log](#).

The screenshot shows the QCBox application window titled "Quality Control Box - NOT FOR RESALE". The interface includes a menu bar at the top with "File", "Settings", "Tests", and "Help". Below the menu bar is a toolbar with various icons. The main area is a table listing media files and their test results. At the bottom, there is a test log window showing detailed output for each test.

Media files	Test pre-set	Success (%)	Finish time
E:\Elly\files_for_test\0011E4.mpg	Loudness & Frozen Video	0.00	04.04.2012/15:24:10.688
E:\Elly\files_for_test\0016TI.mpg	Loudness & Frozen Video	0.00	04.04.2012/15:24:11.606
E:\Elly\files_for_test\00173Q.mpg	Loudness & Frozen Video	100.00	04.04.2012/15:24:12.208
E:\Elly\files_for_test\0030NH.mpg	Loudness & Frozen Video	0.00	04.04.2012/15:24:12.941
E:\Elly\files_for_test\0049V3.mpg	Loudness & Frozen Video	0.00	04.04.2012/15:24:14.113
E:\Elly\files_for_test\0053FQ.mpg	Loudness & Frozen Video	100.00	04.04.2012/15:24:14.866
E:\Elly\files_for_test\0061ED.mpg	Loudness & Frozen Video	0.00	04.04.2012/15:24:16.608
E:\Elly\files_for_test\0062OZ.mpg	Loudness & Frozen Video	0.00	04.04.2012/15:24:16.242
E:\Elly\files_for_test\0126V2.mpg	Loudness & Frozen Video	100.00	04.04.2012/15:24:17.262
E:\Elly\files_for_test\154_5662_01.mpg	Loudness & Frozen Video	100.00	04.04.2012/15:24:18.012
E:\Elly\files_for_test\154_5680_01.mpg	Loudness & Frozen Video	100.00	04.04.2012/15:24:18.605
E:\Elly\files_for_test\154_5687_01.mpg	Loudness & Frozen Video	100.00	04.04.2012/15:24:19.461
E:\Elly\files_for_test\Black_video_2_minutes.mpg	Loudness & Frozen Video	100.00	04.04.2012/15:24:19.943
E:\Elly\files_for_test\CB_390_TS_DirWSS_Iframe_MC76_15.mpg	Loudness & Frozen Video	100.00	04.04.2012/15:24:21.260
E:\Elly\files_for_test\Charlie_rescaled_16_9.mpg	Loudness & Frozen Video	100.00	04.04.2012/15:24:22.044
E:\Elly\files_for_test\Counter_DV.avi	Loudness & Frozen Video	100.00	04.04.2012/15:24:31.952
E:\Elly\files_for_test\KAMELIA.mpg	Loudness & Frozen Video	100.00	04.04.2012/15:24:32.686
E:\Elly\files_for_test\lota.mpg	Loudness & Frozen Video	100.00	04.04.2012/15:24:33.182

The Test Log window shows the following output:

```

Task 1 File: [Status: Stopped]
[04.04.2012/15:24:17.618][INFO][E:\Elly\files_for_test\154_5662_01.mpg][TEST BEGIN][ALL][1] File: E:\Elly\files_for_test\154_5662_01.mpg
[04.04.2012/15:24:18.012][INFO][E:\Elly\files_for_test\154_5662_01.mpg][TEST FAIL][ALL][1] Creating graph failed. File: E:\Elly\files_for_test\154_5662_01.mpg
[04.04.2012/15:24:18.145][INFO][E:\Elly\files_for_test\154_5662_01.mpg][TEST END][ALL][1] File: E:\Elly\files_for_test\154_5662_01.mpg
[04.04.2012/15:24:18.239][INFO][E:\Elly\files_for_test\154_5680_01.mpg][TEST BEGIN][ALL][1] File: E:\Elly\files_for_test\154_5680_01.mpg
[04.04.2012/15:24:18.605][INFO][E:\Elly\files_for_test\154_5680_01.mpg][TEST FAIL][ALL][1] Creating graph failed. File: E:\Elly\files_for_test\154_5680_01.mpg
[04.04.2012/15:24:18.754][INFO][E:\Elly\files_for_test\154_5680_01.mpg][TEST END][ALL][1] File: E:\Elly\files_for_test\154_5680_01.mpg
[04.04.2012/15:24:18.994][INFO][E:\Elly\files_for_test\154_5687_01.mpg][TEST BEGIN][ALL][1] File: E:\Elly\files_for_test\154_5687_01.mpg
[04.04.2012/15:24:19.461][INFO][E:\Elly\files_for_test\154_5687_01.mpg][TEST FAIL][ALL][1] Creating graph failed. File: E:\Elly\files_for_test\154_5687_01.mpg
[04.04.2012/15:24:19.588][INFO][E:\Elly\files_for_test\154_5687_01.mpg][TEST END][ALL][1] File: E:\Elly\files_for_test\154_5687_01.mpg
[04.04.2012/15:24:19.669][INFO][E:\Elly\files_for_test\Black_video_2_minutes.mpg][TEST BEGIN][ALL][1] File: E:\Elly\files_for_test\Black_video_2_minutes.mpg
[04.04.2012/15:24:19.943][INFO][E:\Elly\files_for_test\Black_video_2_minutes.mpg][TEST FAIL][ALL][1] Creating graph failed. File: E:\Elly\files_for_test\Black_video_2_minutes.mpg
[04.04.2012/15:24:20.036][INFO][E:\Elly\files_for_test\Black_video_2_minutes.mpg][TEST END][ALL][1] File: E:\Elly\files_for_test\Black_video_2_minutes.mpg
[04.04.2012/15:24:20.594][INFO][E:\Elly\files_for_test\CB_390_TS_DirWSS_Iframe_MC76_15.mpg][TEST BEGIN][ALL][1] File: E:\Elly\files_for_test\CB_390_TS_DirWSS_Iframe_MC76_15.mpg
[04.04.2012/15:24:21.260][INFO][E:\Elly\files_for_test\CB_390_TS_DirWSS_Iframe_MC76_15.mpg][TEST FAIL][ALL][1] Creating graph failed. File: E:\Elly\files_for_test\CB_390_TS_DirWSS_Iframe_MC76_15.mpg
[04.04.2012/15:24:21.404][INFO][E:\Elly\files_for_test\CB_390_TS_DirWSS_Iframe_MC76_15.mpg][TEST END][ALL][1] File: E:\Elly\files_for_test\CB_390_TS_DirWSS_Iframe_MC76_15.mpg
[04.04.2012/15:24:21.624][INFO][E:\Elly\files_for_test\Charlie_rescaled_16_9.mpg][TEST BEGIN][ALL][1] File: E:\Elly\files_for_test\Charlie_rescaled_16_9.mpg
[04.04.2012/15:24:22.044][INFO][E:\Elly\files_for_test\Charlie_rescaled_16_9.mpg][TEST FAIL][ALL][1] Creating graph failed. File: E:\Elly\files_for_test\Charlie_rescaled_16_9.mpg
[04.04.2012/15:24:22.167][INFO][E:\Elly\files_for_test\Charlie_rescaled_16_9.mpg][TEST END][ALL][1] File: E:\Elly\files_for_test\Charlie_rescaled_16_9.mpg
[04.04.2012/15:24:22.204][INFO][E:\Elly\files_for_test\Counter_DV.avi][TEST BEGIN][ALL][1] File: E:\Elly\files_for_test\Counter_DV.avi
[04.04.2012/15:24:31.807][ERROR][E:\Elly\files_for_test\Counter_DV.avi][Frozen frames detection][Video][1] Frozen display. Time period (ms): 0 - 39960.
[04.04.2012/15:24:31.807][INFO][E:\Elly\files_for_test\Counter_DV.avi][Frozen frames detection][Video][1] End of stream.
[04.04.2012/15:24:32.266][INFO][E:\Elly\files_for_test\Counter_DV.avi][TEST END][ALL][1] File: E:\Elly\files_for_test\Counter_DV.avi
[04.04.2012/15:24:32.367][INFO][E:\Elly\files_for_test\KAMELIA.mpg][TEST BEGIN][ALL][1] File: E:\Elly\files_for_test\KAMELIA.mpg
    
```

THE QCBOX TOOLBAR

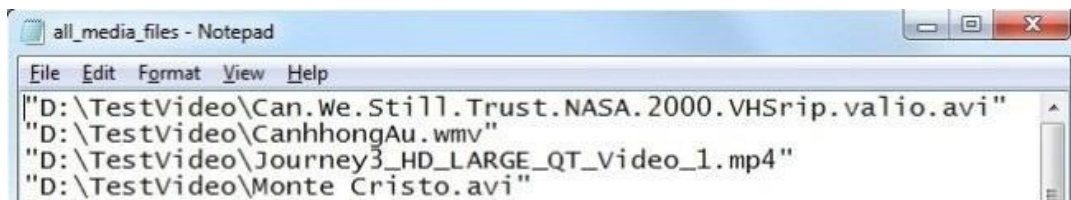
The **QCBox Toolbar** provides quick access to important **QCBox** functionalities. Icons on the toolbar match some of the commands, available on the **Menu bar**.

New QCT Source (Folder) – select a folder with media files for tests.

New QCT Source (Playlist) – select a source playlist. Media files that match playlist items will be checked. Files can be stored on different locations. Only files in the ***.ply** format are supported!

New QCT Source (Set of files) – select multiple files from a single location.

New QCT Source (Text file) – load a text file, containing a list of files for test, including their file paths. The files should be listed in the following format:



```
all_media_files - Notepad
File Edit Format View Help
"D:\TestVideo\Can.We.Still.Trust.NASA.2000.VHSrip.valio.avi"
"D:\TestVideo\CanhhongAu.wmv"
"D:\TestVideo\Journey3_HD_LARGE_QT_Video_1.mp4"
"D:\TestVideo\Monte Cristo.avi"
```



Clear Logs – clears the test log.



Clear Files Set and Logs – clears the file list in the **Files set**, and the test log.



Start Tests – starts the test procedure.



Stop Tests – stops the test procedure.

THE FILES SET

The files set contains the list of media files, available on the selected QCT Source. The files set grid includes the following columns:

Media files – names and paths to all files from the selected source

Test pre-set – selected test presets

Success % - files with test success of 100% can be played by **AirBox**.

Finish time – **the** time of test completion

TEST LOG

The **Test Log** at the bottom of the QCBox window displays a list of test statuses and results for all tested files. Each tested file is described with three entries, on separate rows. The beginning row for each file is colored in blue. The test log also provides information about test start/end time, the name and path for each media, applied test presets, etc.



MENU BAR

The **Menu bar** includes the [File](#), [Settings](#), [Tests](#) and [Help](#) menus, each containing specific commands for the configuration and operation of **QCBox**. All menus are described in detail further in this manual.

FILE MENU

Commands on the **File** menu include mode selection, file source settings and additional options for clearing **QCBox** on-screen logs. Each command is described in details further in this section.

Auto mode

Click **Auto mode** to run **QCBox** in automated mode.

NOTE: Auto mode settings are defined from **Settings > Auto mode**. For more information about those settings, go to the [Auto mode](#) section further in this manual.

New QCT Source (Folder)

Click to select a folder (local or network) as a new source of media files for test. Matches the [New QCT Source \(Folder\)](#) icon on the toolbar.

New QCT Source (Playlist)

Click to select a playlist file as a new source of media files for test. The playlist should be in the native **AirBox** playlist format (*.ply). Matches the [New QCT Source \(Playlist\)](#) icon on the toolbar.

New QCT Source (Set of files)

Click to select specific files for test from a location, containing multiple media files. Matches the [New QCT Source \(Set of files\)](#) icon on the toolbar.

New QCT Source (Text file)

Click to select a text file as a new source of media files for test. The media files and their paths should be listed as follows: "**D:\AirBox Samples\NTSC\Video\PlayBox.mpg**" (including the quotes). Matches the [New QCT Source \(Text file\)](#) icon on the toolbar.

Clear logs

Click to clear the test logs at the bottom of the main **QCBox** window.

Clear Files Set and Logs

Click to clear all files for testing from the **Files set** list and all testing logs at the bottom of the main **QCBox** window.

Exit

Click to exit **QCBox**.

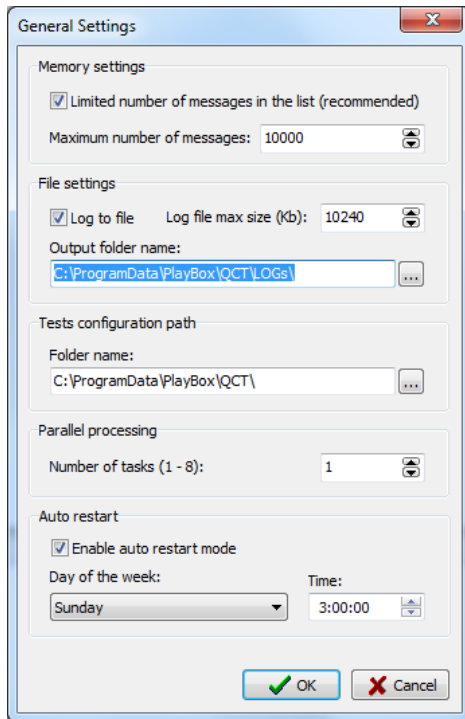


SETTINGS MENU

Commands on the **Settings** menu include general **QCBox** options, auto mode settings and options for adding/editing test presets. Each command is described in details further in this section.

General

The **General Settings** configuration dialog contains the following sections:



Memory settings

To limit the number of entries, displayed in the test log at the bottom of the QCBox window, enable the **Limited number of messages in the list (recommended)** option, and then specify the **Maximum number of messages** from the spin-box below.

File settings

To save the contents of the test log to a text file, enable the **Log to file** option. Specify the maximum size (in kilobytes) of the log file from the **Log file max size (KB)** spin-box to the right. The default log file size is 10 MB.

NOTE: When the log file reaches the specified size, **QCBox** will start writing the log messages to a new file.

In the **Output folder name** field below, specify the folder to which log files should be saved. By default, **QCBox** log files are saved in C:\ProgramData\PlayBox\QCT\LOGs.

Tests configuration path

In the **Folder name** field, specify the file path to the **QCTTestConfig.xml**. This is a configuration file for the tests, performed by **QCBox**. It contains information about all test presets, available in **QCBox**. If you create a custom preset, information about it will also be written to that file.

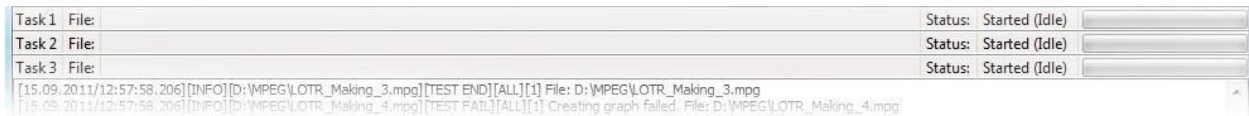


Parallel processing

In the **Number of tasks** spin-box, select the number of tasks files which will be processed simultaneously by **QCBox**.

NOTE: Increasing the number of tasks results in higher CPU usage!

Simultaneous tasks and their status are displayed above the **Test Log** in the main **QCBox** window:



Auto restart

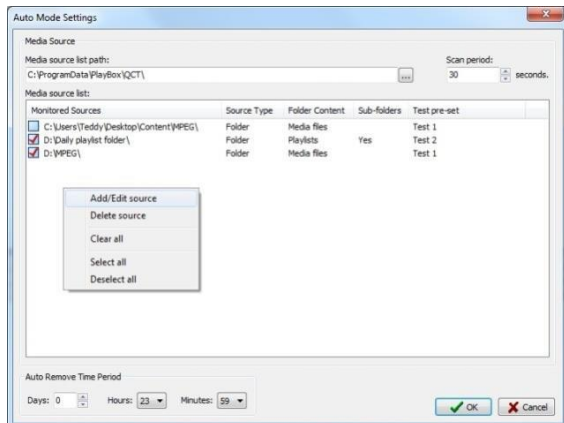
Under **Auto restart**, check the **Enable auto-restart mode** checkbox to allow automated application restart at a user-defined period of time. Select the day of week, on which **QCBox** will be restarted from the drop-down list below. Specify the time of restart from the spin-box to the right.

NOTE: When in Auto-restart mode, **QCBox** will be restarted on the specified time and day every week, unless the settings are changed.

Auto mode

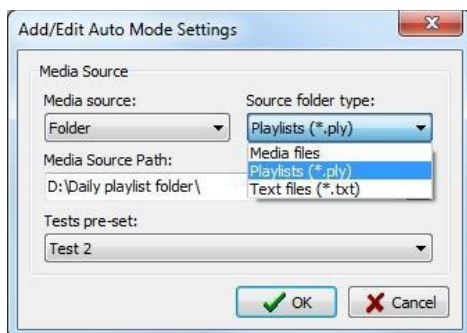
This command opens the **Auto Mode Settings** dialog.

In the **Media source** field specify the path to the **Auto mode config file**.



The **Scan period** spin-box indicates by default that **QCBox** performs tests at predefined regular intervals of 30 seconds.

To Add/Edit a source directory for file verification, right-click somewhere in the **Media source list** area, and then click **Add/Edit source**.





You can add as many source directories as you would like to be automatically scanned. If you would like to temporarily exclude a source for content verification from the *Media source list*, just leave it unchecked (as in the example to the right).

After clicking **Add/Edit source**, the **Add/Edit Auto Mode Settings** dialog opens up.

From the *Media source* drop-down list, choose what type of source to be used for testing (a folder, playlist or a text file).

The *Source folder type* drop-down list appears only in case a **Folder** is specified for *Media source*.

If you would like **QCBox** to check also the subfolders situated in the source directory for checking, check the *Include sub-folders* check-box.

To assign a test preset to an existing **Media source**, select it from the *Test pre-set* drop-down list and click **OK**. A new row appears in the **Auto Mode Settings** configuration dialog.

The *Auto Remove Time Period* field is situated to the bottom of the **Auto Mode Settings** dialog. By default it is set to **23 hours and 59 min**. This option compares the current time and date with the date of the last file verification performed. If more than **23 hours and 59 minutes** have elapsed since the last file verification, **QCBox** will remove all media sources which remained in the *Media source list* for a period longer than **23 hours and 59 min**.

Test presets

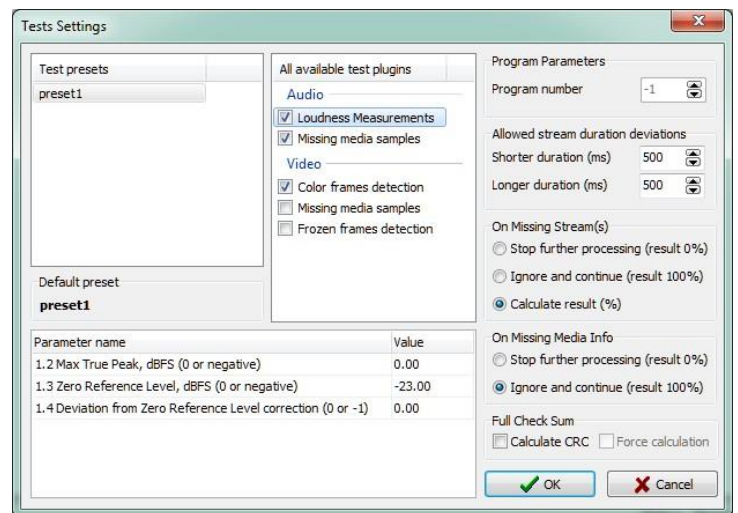
This command opens the **Tests Settings** dialog. Here you can create or modify **Test presets**. Each test preset acts like a template for performing file verification: it contains a list of test plug-ins and a set of parameters, defined for each plug-in. Each plug-in keeps track of different **Parameters**. A set of **Values** may correspond to each **Parameter**.

To **Add/Delete/Delete All/Clone** or **Set as Default a Test preset**, right-click within the **Test Presets** area.

In the *Default preset* field you can see which test preset which is currently set as default. It will appear automatically when you specify a source directory for file verification.

After creating a **Test Preset**, select it by a single left-click over it. From the **All available plugins** field to the right side of the window, select each plug-in you would like to be used for performing the file verification. Currently, we support several plugins (**as in the example to the right**).

At the lower part of the screen, you can see separate Parameters as well as the Values, corresponding to them. They can be changed according to your requirements and needs.



NOTE: The currently defined values are perfectly suitable for use in television quality control. Be aware that if you change these values we do NOT guarantee appropriate results.

Once a test preset is defined and performed over a set of files, a metadata (*.mtd) file is sent to **AirBox**. Thus, if **AirBox** is properly configured for quality control of its playlist files, it uses the abovementioned file and interprets the data in it in order to verify that the respective items have or have not passed the quality check.

In the fields in the right part of the **Tests Settings** dialog you can configure some additional parameters.

The *Allowed stream duration deviations* field is used for comparing the file duration that is written in the metadata file with the playout duration. By default, **QCBox** allows for ± 500 ms but you can enter different values here, in Shorter and Longer duration respectively.

Use the *On Missing Stream(s)* field to tell **QCBox** what to do when it cannot find one or more streams in a given file. Note that each file is accompanied with a number of streams that it contains for audio and video compressions. Thus, the program checks for the presence of each of the streams that are listed to exist within a file. If a stream is not found, **QCBox** allows you to do one of three things:

- Return a result of 0 %
- Return a result of 100 %
- Check the existing streams and calculate the result by subtracting the respective portion of the file (stream(s)) that is / are missing

In the *On Missing Media Info* field you can tell **QCBox** how to act when media info is missing from a certain file. It can send a result of 0 or 100 %.

The calculation of the result (Success %) is described in details in the dedicated [Appendix](#).



Be aware that **QCBox** stores information for files that have already been checked with a certain Test preset. These files are recognized by their name and **QCBox** verifies if the files checked are the same (i.e., the file is not a different one but with the same name) by checking its size in bytes. Thus, if for any reason you are uncertain if the files that have already been checked correspond to the currently checked files, place a check in the **Calculate CRC** box and **QCBox** will compare the size of the previously tested and the currently tested file. For more accurate results you can use the **Force Calculation** box. However, you should note that this will slow down the quality check process.

Below you can see a list of the currently available test plugins, together with their description:

Loudness Measurements – Audio

The first plug-in is designed for performing **Loudness Measurements**. Its parameters are predefined in accordance to the EBU Technical Recommendation R 128. You can choose between two algorithms for loudness measurement, available in our system - ItU R BS 1770-3(3) or ItU R BS 1770-1(1). Read more about loudness normalizing in the corresponding section [below](#). You can also refer to the ITU (International Telecommunication Union) website, <http://www.itu.int/rec/R-REC-BS.1770/>, to view more information about the algorithms.

Please, refer to the table below to view the user configurable parameters for this test preset:

Parameter name	Description
Choose standard to measure the loudness: ItU R BS 1770-3(3) or ItU R BS 1770-1(1)	This is the standard (algorithm) used for loudness measurement. By default, the value is set to 3, which stands for ItU R BS 1770-3(3). If you want to use ItU R BS 1770-1(1), please set the value to 1.
Max True Peak, dBFS	This is the maximum true peak value. By default, the value is 0. The parameter can also be set to a negative number.
Zero Reference Level, dBFS	This is the reference loudness level. By default, its value is -23. It can take a value of 0 or negative values.
Deviation from Zero Reference Level correction	This parameter determines whether deviations from the Zero Reference Level parameter should be allowed. It takes only two values, -1 and 0. By default, the value here is set to 0, which means that deviations are not allowed. If you set the value to -1, the check will be ignored.

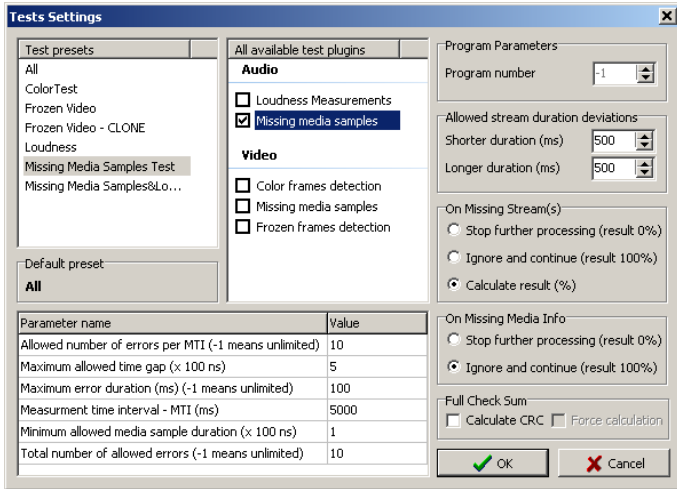
The metadata file that is sent to **AirBox** looks like this:

```
<ProgrammeLoudness>floating point number</ProgrammeLoudness>
<LoudnessRange>floating point number</LoudnessRange>
<TruePeak Channel="0" value="floating point number"/>
<TruePeak Channel="1" value="floating point number"/>
...
<TruePeak Channel="N" value="floating point number"/>
```

AirBox will use the received floating point number values and interpret them in accordance to the EBU Technical Recommendation R 128 target levels, which are stated [below](#).



Missing Media Samples – Audio / Video

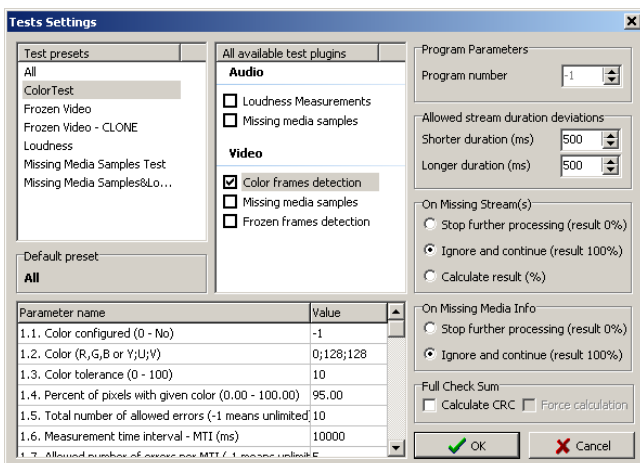


The second plug-in is intended for checking about **Missing media samples** in the Audio and / or Video sources. It checks media sample times, which must increase monotonically. The general idea of this test is to check whether the respective audio / video samples overlap or if there is a gap between them. **QCBox** performs this test with 100-nanosecond unit accuracy.

The parameters that you can define are described below:

Parameter name	Description
Allowed number of errors per MTI (-1 means unlimited)	This is the maximum number of error instances per Measurement Time Interval (see below) which will pass the quality check
Maximum allowed time gap (x 100 ns)	This is the maximum time gap between two samples, measured in 100-nanoseconds that will pass the quality check
Maximum error duration (ms) (-1 means unlimited)	This is the maximum duration of a separate error that will pass the quality check
Measurement time interval – MTI (ms)	This is the Measurement time interval that is used in the Allowed number of errors per MTI parameter
Minimum allowed media sample duration (x 100 ns)	This is the minimum duration of a single media sample that will pass the quality check
Total number of allowed errors (-1 means unlimited)	This is the maximum number of separate error instances that will pass the quality check

Color Frames Detection – Video



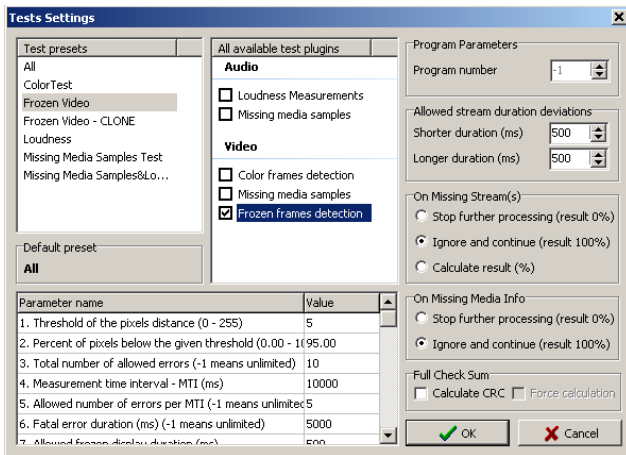
This test checks the content of a video stream and reports the duration of the frames with a predefined color. It is possible to set up to three different colors. The parameters that you can configure are listed and described below:

Parameter name	Description
----------------	-------------



Color configured (0 –No)	If the value is not zero the test will check the content for this color, the color will be skipped otherwise
Color (R,G,B or Y;U;V)	Color to be checked. Use ',' delimiter to specify RGB color or ';' delimiter to specify YUV color
Color tolerance	The allowed deviation for each of the color coordinate (RGB or YUV)
Percent of pixels with given color (0.00 – 100.00)	If the pixels of a frame exceed this percent the test decides the frame is colored with the given color
Total number of allowed errors (-1 means unlimited)	The maximum number of errors allowed per stream
Measurement time interval - MTI (ms)	MTI (ms) - predefined time interval
Allowed number of errors per MTI (-1 means unlimited)	The maximum number of errors allowed per MTI
Fatal error duration (ms) (-1 means unlimited)	The minimum duration that is decided to be a 'fatal error'
Allowed color display duration (ms)	The minimum duration that is decided to be an 'error'

Frozen Frames Detection – Video



This test checks the content of a video stream and reports the duration of the “frozen” frames. The parameters that you can configure are listed and described below:

Parameter name	Description
Threshold of the pixels distance (0 - 255)	The maximum distance between corresponding pixels in two frames
Percent of pixels below the given threshold (0.00 - 100.00)	If the pixels of a frame exceed the percent number, defined here, the quality check will conclude that the frame is frozen
Total number of allowed errors (-1 means unlimited)	The maximum number of errors allowed per stream
Measurement time interval	MTI (ms) - predefined time interval
Allowed number of errors per MTI (-1 means unlimited)	The maximum number of errors allowed per MTI (defined in the parameter above)
Fatal error duration (ms) (-1 means unlimited)	The minimum duration that is decided to be a 'fatal error'
Allowed frozen display duration (ms)	The minimum duration that is decided to be an 'error'

TESTS MENU

It contains two commands: **Start** and **Stop** - for starting or preventing the content verification process.

HELP MENU

Here is the “About” box of the **QCBox** module. It contains useful information such as: module version, WIBU Box number, mode, registration, etc.



AUDIO LEVELS NORMALIZING

This chapter explains in brief the necessity and methods of performing loudness normalization.

WHAT ACTUALLY HAPPENS IN AIRBOX WHEN NORMALIZING?

- Performing a level shifting

AirBox does not process the source sound internally. It normalizes the loudness of the whole programme (file-based playout channel) by adjusting the audio levels. For example, if there is a source file with average programme loudness of **-32 dBFS**, it will be increased with **9 dB** in order to reach the referent **-23 dBFS** specified in the **AirBox** output settings.

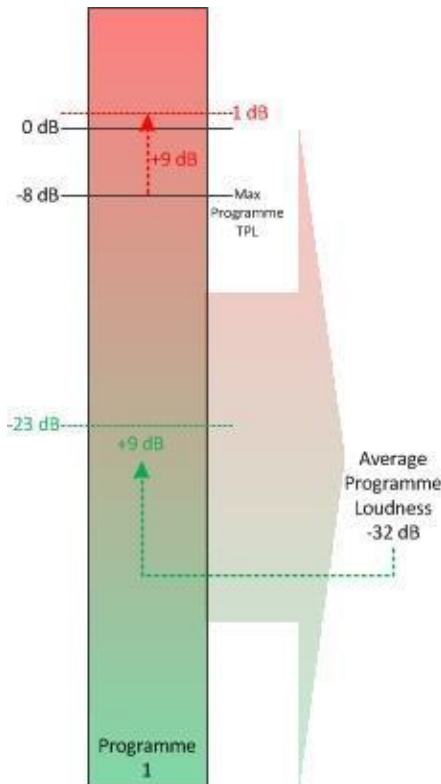
- Keeping track of the maximum true peak level of the audio.

If the maximum true peak level exceeds **zero dB**, there will be a clipping introduced. If the maximum true peak level exceeds the specified value in the **AirBox** output settings, **AirBox** assumes that the source content is not prepared in a good way by the sound engineer. In such case, **AirBox** will not reproduce the relevant media source.

Let us follow the latter example with the source file having average programme loudness of **-32 dBFS**. If the maximum true peak level of this file is **-8 dB**, increased with **9 dB** the peak will jump to **1 dB** (above zero). Exceeding the zero will cause clipping. And exceeding the maximum permitted value (by recommendation: **-1 dB**) will cause skipping the playback of such source.

PLAYBOX WORKFLOW

- Loading playlist
- Reading the *.MTD file, created by the **QCBox** tool for reference
- Reading the relevant audio metadata values, described into it
- Based on the loudness metadata, **AirBox** performs a correction of the audio in order to reach the referent **-23 LUFS** (**-24 LUFS** for US). The value is configurable through the output settings.



OVERVIEW

The normalizing functionality is developed in accordance with EBU Technical Recommendation R 128. It is designed to benefit our clients with the intention of:

- Performing monitoring and control over the perceived loudness of audio sources.
- Reducing loudness differences between programmes. This is applicable when the nature and content of the audio material(s) changes frequently. For example, such problem most commonly occurs at the breaks for advertising: there is a jump between audio levels.

Loudness jumps between broadcast channels and between programmes within the same channel are frequent source of audience complaints. Using the normalizing functionality, the audio levels between separate programmes will be equalized. EBU Rec. R 128 is based on ITU-R BS.1770 and defines a new way of metering and normalizing audio. It also recommends some of the following standards:

- "The Programme Loudness Level shall be normalized to a Target Level of **-23 LUFS**. The permitted deviation from the Target Level shall generally not exceed ± 1 LU for programmes where an exact normalization to Target Level is not achievable practically (for example, live programmes)" – EBU Rec. R 128
- "The Maximum Permitted True Peak Level of a programme during production shall be **-1 dBTP** (dB True Peak)" - EBU Rec. R 128

According to EBU Tech3343, there are two ways to achieve loudness normalization for the consumer:

- The first one is concerning a normalization of the source itself, so that the programmes will be "equally loud by design".



- The second method is related to the use of loudness metadata that describes how loud a programme is. In such case the average programme loudness levels don't need to be changed to a normalized value.

NOTE: **AirBox** does not process the audio by applying a permanent modification (compression, peak limits, EQ) of the source content. It just changes the audio during playback by adjusting audio levels.

HOW TO APPLY THE NECESSARY SETTINGS?

Adjusting QCBox

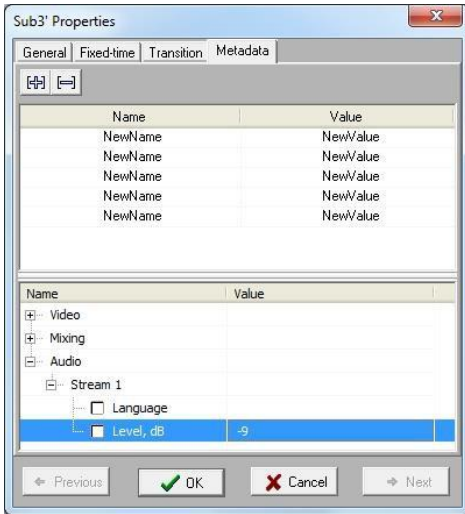
QCBox is a quality control tool intended to guarantee the successful playout of **AirBox** media files. **QCBox** is checking sets of files, playlists or separate directories. Performing content verification can be loudness-related as well as concerning missing audio or video media samples. It stores quality data descriptions into a *.MTD file, corresponding to each media file checked. **AirBox** will play or skip a clip depending on the quality data and the user-defined actions.

- ✓ Launch **QCBox**
- ✓ Go to **Settings** menu ⇒ **Test presets**.

```
Sub3.mpg.mtd
file:///C:/Users/Teddy/Desktop/Content/LOUDNESS/Sub3.mpg.mtd
<Name>Loudness_Measurements</Name>
<MajorMediaTypeId>{73647561-0000-0010-8000-00AA00389B71}</MajorMediaTypeId>
<MajorMediaTypeName>Audio</MajorMediaTypeName>
<TestVersion>1.0</TestVersion>
<Timestamp>14.07.2011/10:53:27.287</Timestamp>
<Weight>1</Weight>
<Result>100.00</Result>
<TestOutData>
  <ProgrammeLoudness>-14.0</ProgrammeLoudness>
  <LoudnessRange>10.74</LoudnessRange>
  <TruePeak Channel="0" Value="0.20"/>
  <TruePeak Channel="1" Value="-0.70"/>
</TestOutData>
</Test>
<Test>
  <Id>{D7D0EC7C-1433-4253-AF83-A520520B641C}</Id>
  <Instance>1</Instance>
  <Name>Missing media samples</Name>
  <MajorMediaTypeId>{73647561-0000-0010-8000-00AA00389B71}</MajorMediaTypeId>
  <MajorMediaTypeName>Audio</MajorMediaTypeName>
  <TestVersion>1.0</TestVersion>
  <Timestamp>14.07.2011/10:53:27.317</Timestamp>
  <Weight>1</Weight>
  <Result>95.00</Result>
  <TestRunParameters>
    <RunParam Name="Minimum allowed media sample duration (x 100 ns)" Value="1000000000"/>
    <RunParam Name="Total number of allowed errors (-1 means unlimited)" Value="1000000000"/>
    <RunParam Name="Maximum allowed time gap (x 100 ns)" Value="1000000000"/>
    <RunParam Name="Allowed amount of errors per STI (x 100 ns)" Value="1000000000"/>
  </TestRunParameters>
</Test>
```

- ✓ A new configuration dialog opens up
- ✓ To **Add**, **Delete** or **Set as default** a new test preset, right-click within the **Test presets** field.
- ✓ Then choose the proper plug-in for tests performing out of the right-hand side of the dialog.

If **Loudness measurements** is selected, **QCBox** will store a loudness metadata into an *.MTD file, corresponding to each tested media file. You can see an example of such *.MTD file opened on the right part of the screen. There is a "**Programme loudness**" value of -14.0 (underlined). This value represents the average loudness of a programme (playlist media file).



Based on this value, **AirBox** will perform a correction of the audio levels. For example, if the average loudness of a programme is **-14.0 dB**, **AirBox** will make it lower with **9 dB** in order to reach the referent **-23 dBFS**. The correction of **-9 dB** for the relevant programme (playlist clip) is visible to the playlist clip properties: **right-click** the clip inside the playlist ⇒ **Properties** ⇒ **Metadata** tab (see the example to the left). Such correction is different depending on each programme (playlist clip).

Let's get back to **QCBox**.

✓ Go to the **File** menu or use the **Toolbar** to define a **QCT source** for testing. The **Source** can be an entire folder or set of files, an AirBox playlist (*.ply file) or a text file.



- ✓ Into the newly opened dialog, browse the source for testing.
- ✓ From the **Test preset** drop-down list, choose a previously created test

preset that you would like to use.

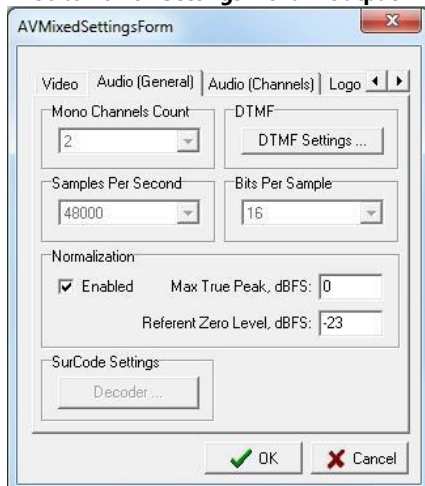
✓ Click **OK**. All media files inside the specified directory will be listed into the **Files set** field. It occupies the main part of the interface.

✓ Then go to the **Tests** drop-down menu and click **Start** (you can also use the relevant button situated in the **Toolbar**).

QCBox will start to perform tests of the media content, storing the test results as a metadata to an *.MTD file corresponding to each media file tested.

Adjusting AirBox

✓ Go to **AirBox Settings** menu ⇒ **Output**



- ✓ Select the **Audio (General)** tab
- ✓ In the **Normalization** field, check **Enabled**
- ✓ A value of **-23 dBFS** is corresponding to **the Referent Zero Level** (by default). This is a target level by which the programme loudness level should be normalized in accordance with EBU rec. R 128. There is a tolerance of **±1.0 LU** existing for programmes where an exact normalization is not achievable practically.
- ✓ To the **Max True Peak dBFS** string you should indicate the maximum permitted TPL. According to EBU R 128 it is **-1dBTP** (measured with a **True Peak** meter)



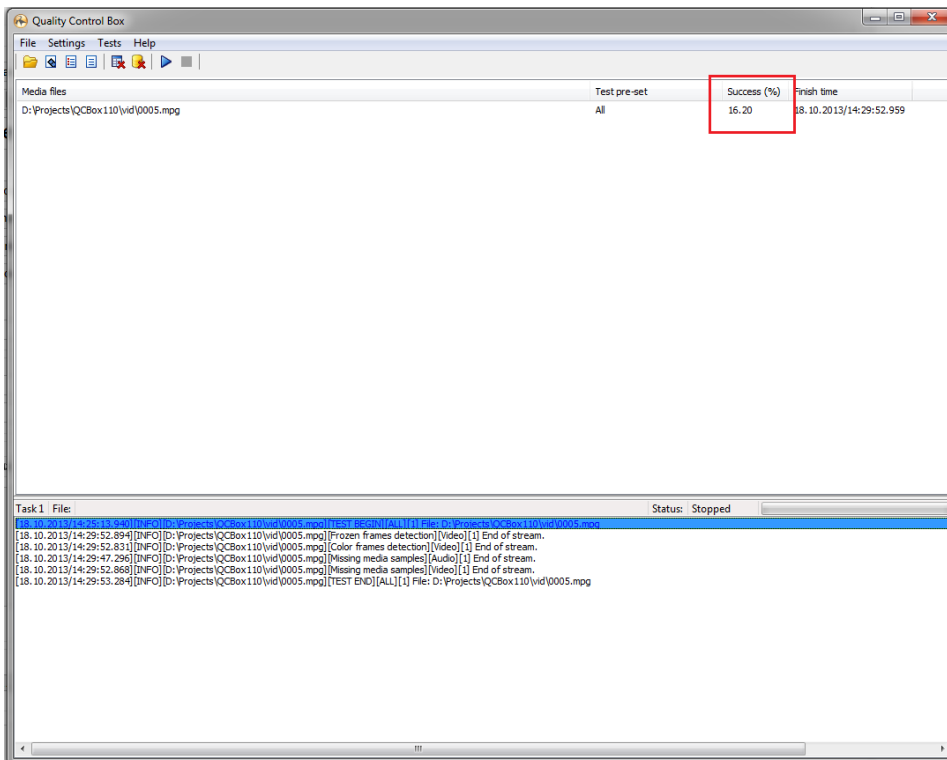
APPENDIX – Formula for Success (%) in QCBox

Success in %, as displayed in the image below, is equal to the **Result** from the **GeneralMedialInfo** tag from the *.mtd file. For reference, please, check the example *.mtd file, displayed [below](#).

The **Result** from the **GeneralMedialInfo** tag is a multiplication of the **Result** from the **MedialInfoCheck** tag (it is a common test) by the **Result** from test tags (this is the results from the selected preset).

For example,

If you refer to the attached screen shot and metadata file, then the Success (%) is calculated as follows:

$$\text{Success(\%)} = \text{Result}[\text{GeneralMedialInfo}] = \text{Result}[\text{MedialInfoCheck}] * \text{Resultn}[\text{Testn}]$$
$$16.20\% = 16.20\%[\text{GeneralMedialInfo}] = 100\%[\text{MedialInfoCheck}] * 100\%[\text{Test:Missing media samples, audio}] * 100\%[\text{Test:Missing media samples, video}] * 100\%[\text{Test:Color frames detection}] * 16.20\%[\text{Test:Frozen frames detection}]$$




SAMPLE METADATA FILE

```
<?xml version="1.0" encoding="UTF-8" ?>
- <MediaMetadata>
- <GeneralMediaInfo>
  <Size>1911961088</Size>
  <DateModified>13.06.2013/13:37:09.684</DateModified>
  <PartChecksum>E6670C9A</PartChecksum>
  <FullChecksum>157C6A2C</FullChecksum>
  <Checked>true</Checked>
  <CheckerVersion>1.0</CheckerVersion>
  <Result>16.20</Result>
  <MinResult>16.20</MinResult>
  <Timestamp>18.10.2013/14:29:52.959</Timestamp>
</GeneralMediaInfo>
- <Tests>
- <CommonTests>
- <MediaInfoCheck>
  <Timestamp>18.10.2013/14:29:52.918</Timestamp>
  <Result>100.00</Result>
</MediaInfoCheck>
</CommonTests>
- <Test>
  <Id>{D7D0EC7C-1433-4253-AF83-A520520B641C}</Id>
  <Instance>1</Instance>
  <Name>Missing media samples</Name>
  <MajorMediaType>{73647561-0000-0010-8000-00AA00389B71}</MajorMediaType>
  <MajorMediaTypeName>Audio</MajorMediaTypeName>
  <TestVersion>1.0</TestVersion>
  <Timestamp>18.10.2013/14:29:47.296</Timestamp>
  <Weight>1</Weight>
  <Result>100.00</Result>
- <TestRunParameters>
  <RunParam Name="Minimum allowed media sample duration (x 100 ns)" Value="209" />
  <RunParam Name="Total number of allowed errors (-1 means unlimited)" Value="10" />
  <RunParam Name="Maximum allowed time gap (x 100 ns)" Value="166666" />
  <RunParam Name="Maximum error duration (ms) (-1 means unlimited)" Value="100" />
  <RunParam Name="Allowed number of errors per MTI (-1 means unlimited)" Value="10" />
  <RunParam Name="Measurment time interval - MTI (ms)" Value="5000" />
</TestRunParameters>
</Test>
- <Test>
```



```
<Id>{1D7878C6-C230-4809-BFC8-166270220096}</Id>
<Instance>1</Instance>
<Name>Color frames detection</Name>
<MajorMediaType>{73646976-0000-0010-8000-00AA00389B71}</MajorMediaType>
<MajorMediaTypeName>Video</MajorMediaTypeName>
<TestVersion>1.0</TestVersion>
<Timestamp>18.10.2013/14:29:52.831</Timestamp>
<Weight>1</Weight>
<Result>100.00</Result>
=><TestRunParameters>
  <RunParam Name="3.6. Measurement time interval - MTI (ms)" Value="10000" />
  <RunParam Name="1.4. Percent of pixels with given color (0.00 - 100.00)" Value="95.00" />
  <RunParam Name="2.6. Measurement time interval - MTI (ms)" Value="10000" />
  <RunParam Name="3.1. Color configured (0 - No)" Value="0" />
  <RunParam Name="1.9. Allowed color display duration (ms)" Value="500" />
  <RunParam Name="1.8. Fatal error duration (ms) (-1 means unlimited)" Value="5000" />
  <RunParam Name="1.2. Color (R,G,B or Y;U;V)" Value="0;128;128" />
  <RunParam Name="2.4. Percent of pixels with given color (0.00 - 100.00)" Value="95.00" />
  <RunParam Name="3.5. Total number of allowed errors (-1 means unlimited)" Value="10" />
  <RunParam Name="1.6. Measurement time interval - MTI (ms)" Value="10000" />
  <RunParam Name="1.3. Color tolerance (0 - 100)" Value="10" />
  <RunParam Name="3.7. Allowed number of errors per MTI (-1 means unlimited)" Value="5"
    />
  <RunParam Name="2.1. Color configured (0 - No)" Value="0" />
  <RunParam Name="3.3. Color tolerance (0 - 100)" Value="10" />
  <RunParam Name="3.8. Fatal error duration (ms) (-1 means unlimited)" Value="5000" />
  <RunParam Name="2.8. Fatal error duration (ms) (-1 means unlimited)" Value="5000" />
  <RunParam Name="2.7. Allowed number of errors per MTI (-1 means unlimited)" Value="5"
    />
  <RunParam Name="2.9. Allowed color display duration (ms)" Value="500" />
  <RunParam Name="2.3. Color tolerance (0 - 100)" Value="10" />
  <RunParam Name="2.2. Color (R,G,B or Y;U;V)" Value="0,134,0" />
  <RunParam Name="3.4. Percent of pixels with given color (0.00 - 100.00)" Value="95.00" />
  <RunParam Name="3.9. Allowed color display duration (ms)" Value="500" />
  <RunParam Name="3.2. Color (R,G,B or Y;U;V)" Value="0,161,0" />
  <RunParam Name="1.7. Allowed number of errors per MTI (-1 means unlimited)" Value="5"
    />
  <RunParam Name="1.1. Color configured (0 - No)" Value="-1" />
  <RunParam Name="1.5. Total number of allowed errors (-1 means unlimited)" Value="10" />
  <RunParam Name="2.5. Total number of allowed errors (-1 means unlimited)" Value="10" />
</TestRunParameters>
</Test>
=><Test>
```



```
<Id>{42BBE99B-384C-4A9C-B73D-D42B7522D1C4}</Id>
<Instance>1</Instance>
<Name>Missing media samples</Name>
<MajorMediaType>{73646976-0000-0010-8000-00AA00389B71}</MajorMediaType>
<MajorMediaTypeName>Video</MajorMediaTypeName>
<TestVersion>1.0</TestVersion>
<Timestamp>18.10.2013/14:29:52.868</Timestamp>
<Weight>1</Weight>
<Result>100.00</Result>
- <TestRunParameters>
  <RunParam Name="Minimum allowed media sample duration (x 100 ns)" Value="160000" />
  <RunParam Name="Total number of allowed errors (-1 means unlimited)" Value="10" />
  <RunParam Name="Maximum allowed time gap (x 100 ns)" Value="166666" />
  <RunParam Name="Maximum error duration (ms) (-1 means unlimited)" Value="100" />
  <RunParam Name="Allowed number of errors per MTI (-1 means unlimited)" Value="10" />
  <RunParam Name="Measurment time interval - MTI (ms)" Value="5000" />
</TestRunParameters>
</Test>
- <Test>
  <Id>{30EDC72B-DCFE-4E6C-8544-613551D364DE}</Id>
  <Instance>1</Instance>
  <Name>Frozen frames detection</Name>
  <MajorMediaType>{73646976-0000-0010-8000-00AA00389B71}</MajorMediaType>
  <MajorMediaTypeName>Video</MajorMediaTypeName>
  <TestVersion>1.0</TestVersion>
  <Timestamp>18.10.2013/14:29:52.894</Timestamp>
  <Weight>1</Weight>
  <Result>16.20</Result>
- <TestRunParameters>
  <RunParam Name="4. Measurement time interval - MTI (ms)" Value="10000" />
  <RunParam Name="7. Allowed frozen display duration (ms)" Value="500" />
  <RunParam Name="1. Threshold of the pixels distance (0 - 255)" Value="5" />
  <RunParam Name="2. Percent of pixels below the given threshold (0.00 - 100.00)"
    Value="95.00" />
  <RunParam Name="6. Fatal error duration (ms) (-1 means unlimited)" Value="5000" />
  <RunParam Name="5. Allowed number of errors per MTI (-1 means unlimited)" Value="5" />
  <RunParam Name="3. Total number of allowed errors (-1 means unlimited)" Value="10" />
</TestRunParameters>
</Test>
</Tests>
</MediaMetadata>
```



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