

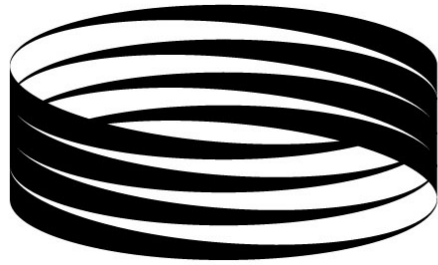
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**dts**<sup>TM</sup>

Digital Entertainment

# **DTS<sup>®</sup> Timecode Quality Control User Guide**

**Revision A**

**Effective Date: February 2007  
Document # 9301F45600**

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### Record of Changes

Manual Version / Date	Description
A / February 2007	Documents TCQC software version 2.00.03.
2.0 / December 2006	Documents TCQC software version 2.00.02.



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Ship returns (clearly marked with the Return Authorization number on the outside of the package) to:

DTS, Inc.  
Attn: Customer Service  
5171 Clareton Drive  
Agoura Hills, California 91301 USA

Technical Service email, telephone and FAX numbers for returns are:

Email: [techsupport@dts.com](mailto:techsupport@dts.com)  
Phone: +1 (818) 706.3525 from outside the USA or +1 (800) 959.4109 from within the continental USA  
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## 1. Introduction

This document describes the DTS® Timecode Quality Control (TCQC) system and how to use it. The TCQC system helps filmmakers control the quality of DTS Timecode on sound negatives and prints. Its features and benefits include:

- A user-friendly interface that is easy to follow
- Indicators that help users find and identify problems quickly
- Reports that satisfy DTS requirements—and can be easily transmitted by email
- Archives for easy storage and retrieval of data and reports on TCQC sessions

### 1.1 Purpose

DTS TCQC Software, Version 2 or later, provides a method of testing the quality of DTS Timecode on film. DTS requires that this system be used to determine the usability of each negative used to print DTS Timecode. It should also be used on a sample set from each print-run to help ensure quality of the release printing.

### 1.2 Test Data

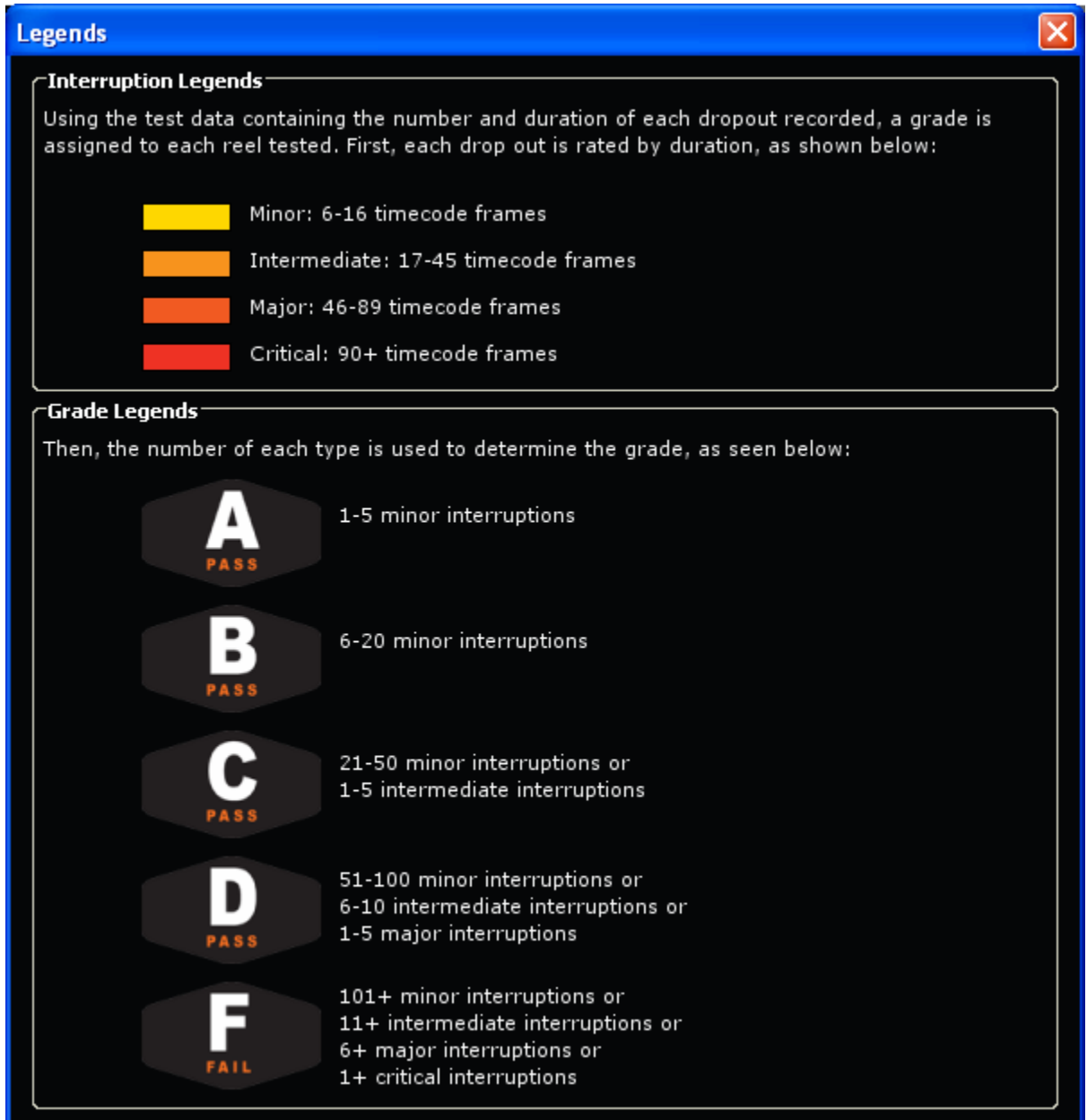
The TCQC tests each reel of a print for timecode interruptions. Each reel is identified by a reel number and the unique serial number of the film. The TCQC system detects any timecode interruptions on the reel, tallies the number of timecode interruptions, and reports the following information about them:

- Type of Interruption (Minor, Intermediate, Major or Critical)
- Location (feet/frames)
- Duration (frames)



## 1.3 Grading

Using the test data containing the number and duration of each dropout recorded, a grade is assigned to each reel tested. Then the number of each type is used to determine the grade. The grading system can be viewed in the Legends screen, shown in Figure 1. This screen is accessed from the TCQC GUI toolbar by selecting **About TCQC → Legends**.



**Legends**

**Interruption Legends**

Using the test data containing the number and duration of each dropout recorded, a grade is assigned to each reel tested. First, each drop out is rated by duration, as shown below:

- Minor: 6-16 timecode frames
- Intermediate: 17-45 timecode frames
- Major: 46-89 timecode frames
- Critical: 90+ timecode frames

**Grade Legends**

Then, the number of each type is used to determine the grade, as seen below:

- A** PASS: 1-5 minor interruptions
- B** PASS: 6-20 minor interruptions
- C** PASS: 21-50 minor interruptions or 1-5 intermediate interruptions
- D** PASS: 51-100 minor interruptions or 6-10 intermediate interruptions or 1-5 major interruptions
- F** FAIL: 101+ minor interruptions or 11+ intermediate interruptions or 6+ major interruptions or 1+ critical interruptions

Figure 1: Grading System

## 1.4 Results

The TCQC test results allows for the proper determination of whether a sound negative passes, needs to be inspected, or fails. The different grades can also disclose minor problems in the process before they cause a failure. Additional DTS grading guidelines are listed below.

**A: Pass**

The reel had 1-5 minor timecode interruptions. The sound negative can be used to print.

**B: Inspect**

There were between 6 and 20 minor timecode interruptions. The reel should be inspected to determine if the interruptions are print-related or if they exist on the negative.

**C: Inspect**

There were either 21-50 minor interruptions **or** 1-5 intermediate interruptions. The reel should be inspected to determine if the interruptions are print-related or if they exist on the negative.

**D: Inspect**

The number of interruptions may cause an audible dropout if the film degrades or if the reader head in the field is not calibrated. The reel should be inspected to determine if the interruptions are print-related or if they exist on the negative. If the interruptions are caused by the printing process, the customer may choose to reprint to ensure the integrity of the negative.

**F: Fail**

The timecode was not read for three or more seconds, which will cause an audible dropout. The reel should be inspected to determine if the interruptions are print-related or if they exist on the negative. If the interruptions are caused by the printing process, the customer should reprint to ensure the integrity of the negative.

## 2. System Requirements

- IBM-compatible Personal Computer
- Windows XP Operating System
- Minimum of 128 MB RAM
- Minimum 1.5 GHz Processor
- 1-2 USB ports (Depending on number of projectors)
- Monitor with at least 1024 x 768 resolution
- Color printer (Optional)
- Internet access for email
- PDF writer (Optional)

## 3. Installation

### 3.1 Packaging

DTS supplies the following:

- DTS® Timecode Quality Control Software, Part # 9311H10100 (Version 2 or later)
- RS485 to USB converter box, Part #5110002700
- DTS® Timecode Reader Head, Standard 35mm, Part # 9010D60000 (Rev E or later)
- Cable Assembly, Timecode QC, RS-485, Part # 9022F63400

Note: The software disc includes the following:

- DTS® Timecode Quality Control User Guide, Part # 9301F45600 (Ver 2 or later)
- Software License Agreement, Part # 9306H11200
- Cable diagram, Part # F634

### 3.2 Hardware Set-Up

To set up the system:

1. Connect one end of the Cable Assembly, Timecode QC, RS485, Part # 9022F63400, to the reader head.
2. Connect the other end of the Cable Assembly, Timecode QC, RS485, Part # 9022F63400, to the converter.
3. Connect one end of the USB cable to the converter.
4. Connect the other end of the USB cable to a USB port on the computer.
5. If audio is to be QC'd, connect the pigtail cable to timecode cable from the DTS playback unit.
6. Repeat above procedure for Projector 2, if using two projectors.

Note 1: Each projector must be configured to a unique com port. The default port for Projector 1 is COM3, and the default port for Projector 2 is COM4. If other ports are used, they must be selected within the DTS TCQC software.



#### **CAUTION!**

Be sure to use the **RS485** cable to connect a Timecode Reader Head configured for QC operating mode to a 6, 6D, 6AD or XD10 DTS Player. Using another cable could damage the Cinema Media Player.

If the existing system is configured using other cables, they will need to be replaced with **RS485** cables.

Note 2: For further information, cable diagram #F634 is included on the software disc.

### 3.2.1 Configuration

Figure 2 and Figure 3 show the TCQC configuration.

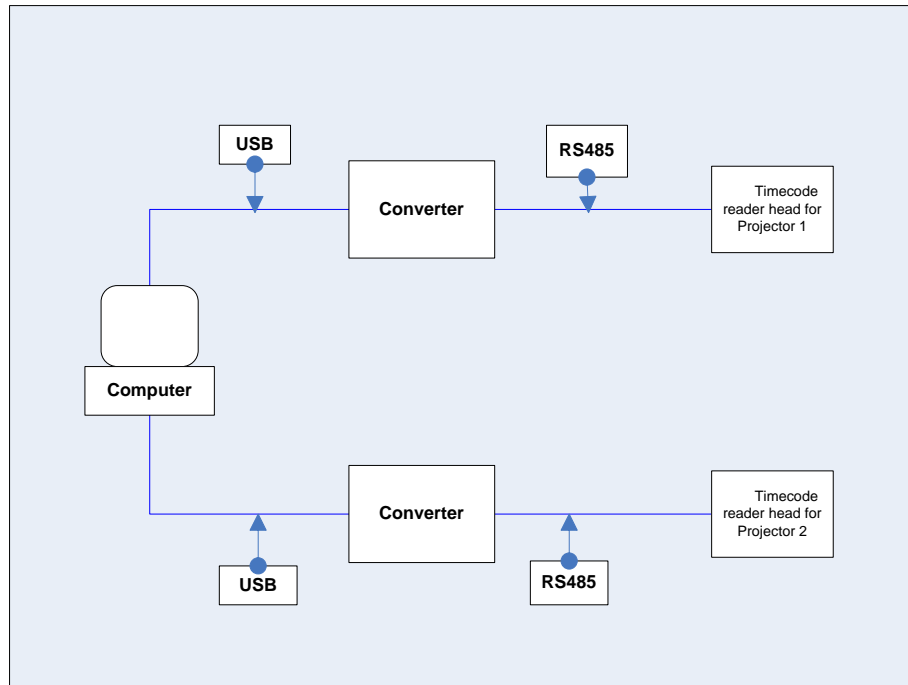


Figure 2: Two-Projector Configuration

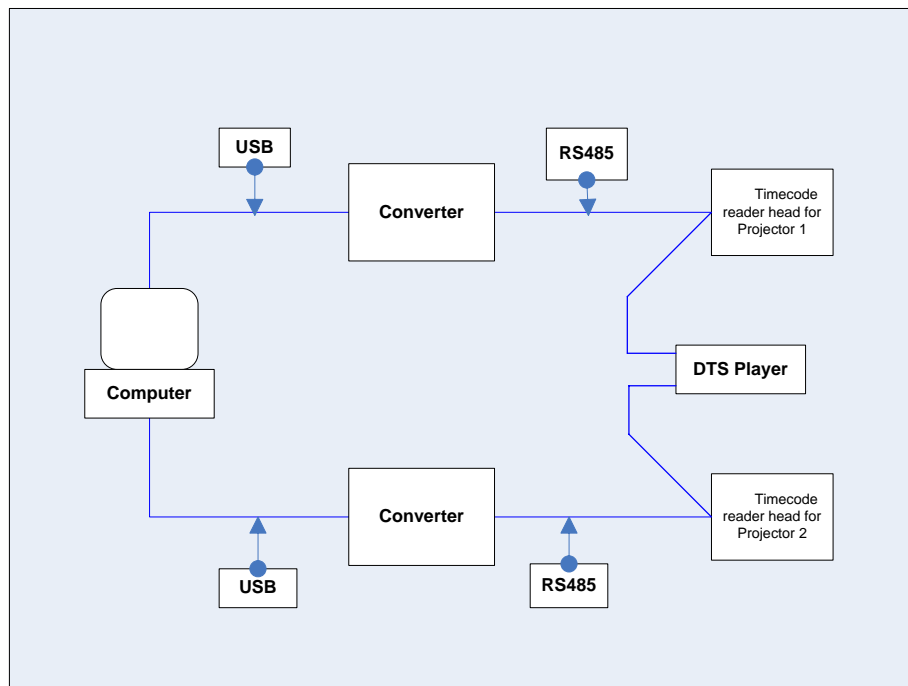


Figure 3: Two-Projector Configuration with DTS Audio Playback

### 3.3 User Interface

The TCQC GUI (Figure 4) allows for easy viewing of the progress of the test and the results. The GUI contains the following six panels:

- Film Information
- Print Information
- Grade Information
- Histogram
- Summary List
- Detail List

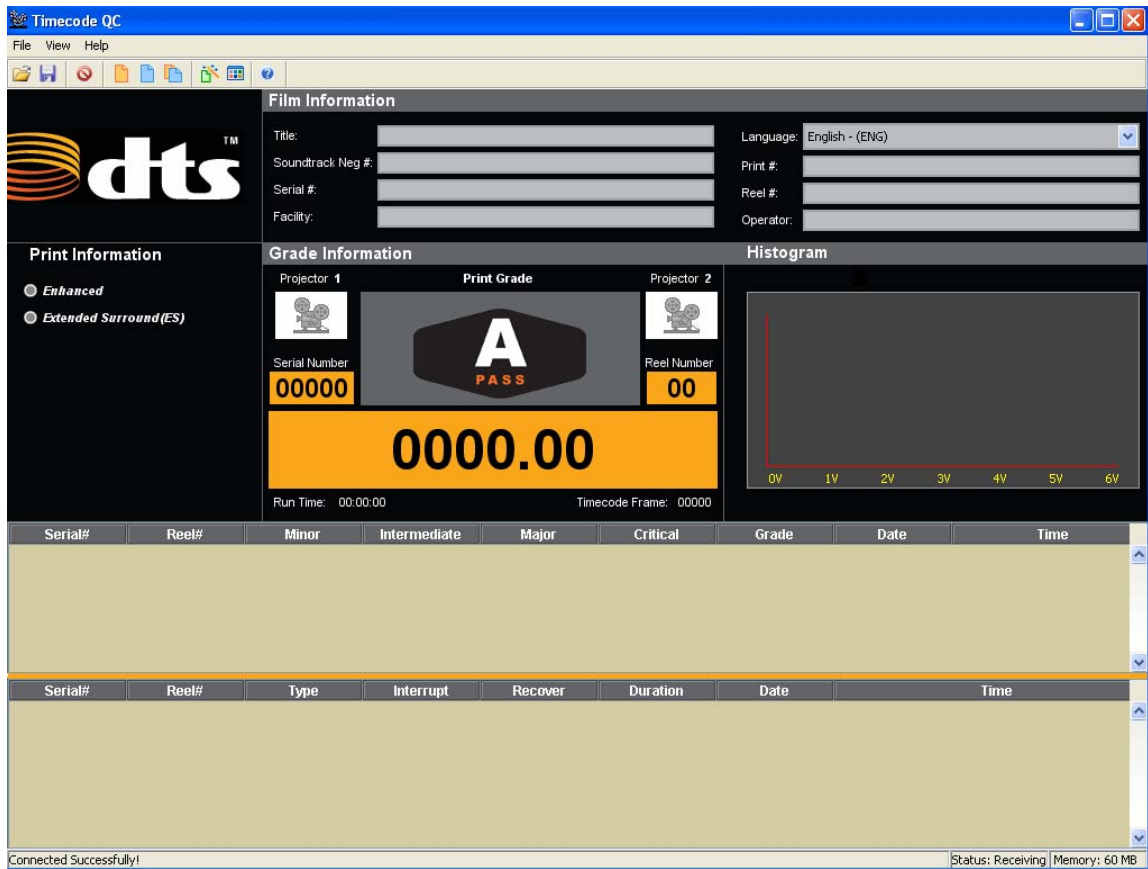


Figure 4: TCQC GUI

## 3.4 TCQC GUI Panels

The panels and fields are described below, as they appear from left to right at the top of the GUI.

### 3.4.1 Film Information

There are eight ID fields located at the top of the GUI in the Film Information panel. The fields identify the film title and language, the soundtrack negative, print, serial and reel numbers, the location of the TCQC process, and the name of the operator.

### 3.4.2 Enhanced

The Enhanced Timecode light, located in the Print Information panel, indicates whether timecode on the current reel is enhanced.

### 3.4.3 Extended Surround (ES)

The Extended Surround light, also located in the Print Information panel, indicates whether the reel was assigned an Extended Surround (ES) serial number.

### 3.4.4 Projectors

The icons for Projector 1 and Projector 2, located in the Grade Information panel, indicate which projector is running and whether the timecode is being read properly.

### 3.4.5 Serial Number and Reel Number

The Serial Number and Reel Number fields, located under the projector icons, display the serial number and reel number currently being read from the film.

### 3.4.6 Print Grade

The print grade, displayed in the Grade Information panel, consists of a letter grade (A-F) and a "Pass/Fail." The grade is based on the number of timecode interruptions the reel contains. The grade starts as an "A" and is automatically lowered if there are enough interruptions to lower the grade. The grading system is defined in Section 1.3.

### 3.4.7 Run Time and Timecode Frame

The Run Time and Timecode Frame numbers, located in the Grade Information panel, display the duration from the start mark of each reel being read. The distance is measured in time and frames.

### 3.4.8 Voltage Histogram

The Voltage histogram indicates whether the voltage being read from the timecode reader head is normal.

### 3.4.9 Summary List

The Summary List is a horizontal panel that spans the width of the GUI. It is located under the Print Information, Grade Information and Histogram panels. It displays a running summary of the number and type of interruptions on each reel and the overall grade of the reel.

### 3.4.10 Detail List

The Detail list is a horizontal panel located under the Summary List panel. It displays the following information on each interruption: type, location, duration, date and time.










## 3.5 TCQC Tool Bar

The TCQC GUI also contains a toolbar (Figure 5) at the top left of the screen.



Figure 5: TCQC Toolbar


The TCQC toolbar provides the tools to:

-  Open Folders and Files
-  Save Files
-  End Current Session
-  Print Detail Reports
-  Print Summary Reports
-  Print Master Reports
-  Configure COM Ports
-  View Information about the Grading System
-  Obtain Help

The tools in the toolbar are discussed in Sections 5 and 6.



## 4. Set Up Projector Com Ports

Click on the Configuration tool  on the tool bar to open the Projector Setup screen (Figure 6).

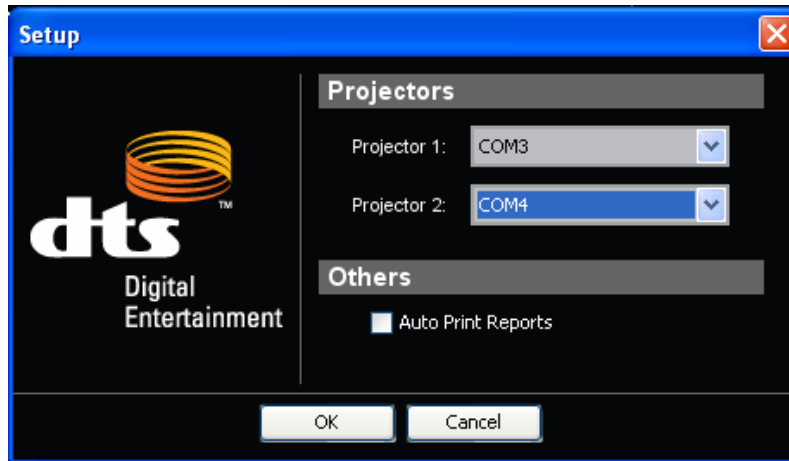


Figure 6: Projector Setup Screen

1. Use the drop-down menu for Projector 1 to select the Com port for Projector 1.
2. Use the drop-down menu for Projector 2 to select the Com port for Projector 2.
3. Check the **Auto Print Reports** box to automatically print reports to PDF files after each TCQC session.

## 5. Run a Session

### 5.1 Obtain ID Information

View the identifying information at the front of the reel.

### 5.2 Access GUI

Locate the TCQC software application file and double click on it to open the GUI (Figure 7).

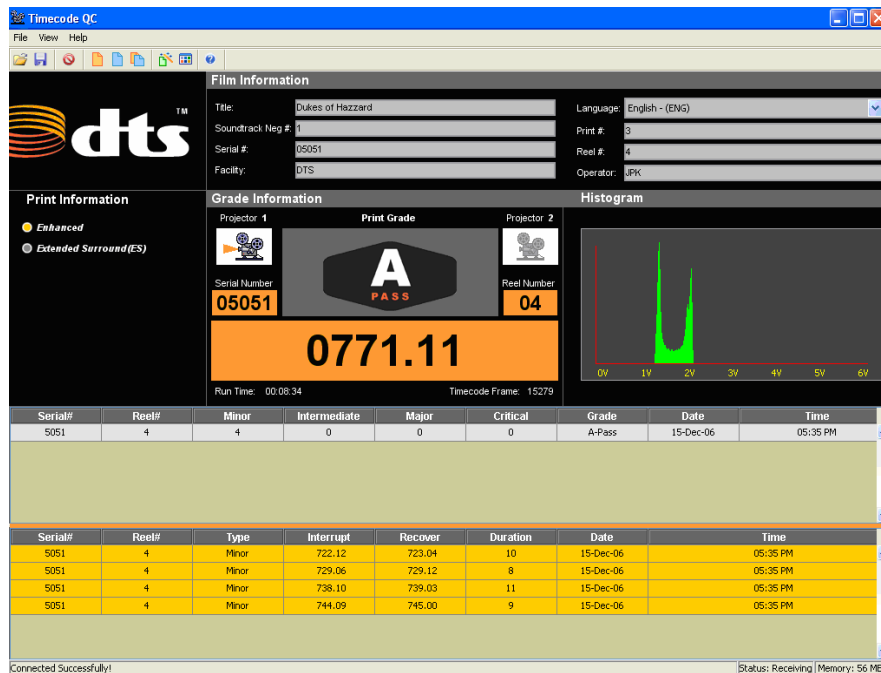


Figure 7: TCQC GUI Panels and Fields

### 5.3 Enter Film Information

Fill in the Film Information ID fields at the top of the screen. This information will appear on the reports of TCQC sessions. It will also become part of the report file names, for easy retrieval. For more information, see Section 3.4. The Film Information ID fields are:

- Film Title
- Language
- Soundtrack Neg #
- Print #
- Serial #
- Reel #
- Name of Facility
- Name of Operator

For a *feature film*, it is necessary to fill in all of the fields during the session. If the required fields are not filled in, it will not be possible to start a new session. Also, data from the current session will not be saved and will not be able to be printed.

For *trailers (R14)*, it is not necessary to fill in any of the fields during the session. All trailer data will be saved to a separate trailer folder.

## 5.4 Load the Reel

Load the reel and start playback on the projector. When timecode is received, the session will begin automatically.

## 5.5 Status Indicators

The GUI provides a number of indicators which assist in monitoring the progress of the session in real time. From left to right on the GUI, they are:

### 5.5.1 Enhanced Timecode

If the film currently being graded is enhanced, this light will be yellow. The yellow light indicates that enhanced timecode was detected and is correct.

### 5.5.2 Extended Surround (ES)

If the reel was assigned an Extended Surround (ES) serial number, this light will be yellow. If the DTS cinema system contains an Extended Surround decoder, it will automatically engage when an ES serial number is detected.

### 5.5.3 Projector Icons

**Illuminated.** When the reader head is reading valid timecode, the icon for the appropriate projector illuminates and displays an orange beam of light.

**Grayed Out.** When the reader head is not reading timecode, the icon for the projector is grayed out.

- Note: When two projectors are being used, the icon for the active projector will illuminate and the icon for the inactive projector will be grayed out.

### 5.5.4 Serial Number and Reel Numbers

When the session starts, the serial number and reel number being read from the film will be displayed in the orange boxes under the projector icons.

If either number being read is different from the number entered by the operator, a warning message will be displayed. This function is especially helpful if the timecode is being evaluated without monitoring the DTS soundtrack disc at the same time.

### 5.5.5 Print Grade

At the beginning of the reel, the grade will be A and the word PASS will be displayed. If the number of allowable errors for that grade is exceeded, the grade will drop. If this happens, the GUI screen will automatically refresh and the lower grade will be displayed.

### 5.5.6 Voltage Histogram

The Voltage histogram and the data used to generate it is not part of the grading scheme; it is an auxiliary indicator used as a tool to help identify possible causes of problems.

The Voltage histogram indicates the voltage being read from the timecode reader head. The histograms in Figure 8, Figure 9, and Figure 10 show examples of no timecode with an unthreaded reader head, good timecode, and poor timecode, respectively.

The histogram in Figure 8 shows a single reading of approximately 3.8 volts. This indicates that there is no film threaded in the reader head.

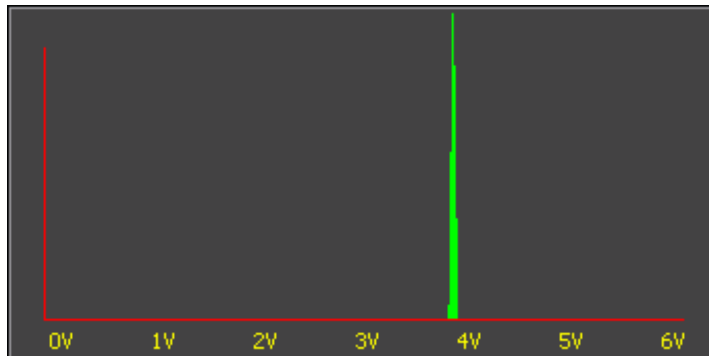


Figure 8: Histogram of Unthreaded Reader Head

The histogram in Figure 9, with two peaks separated by a valley, indicates that timecode is being properly read from the film.

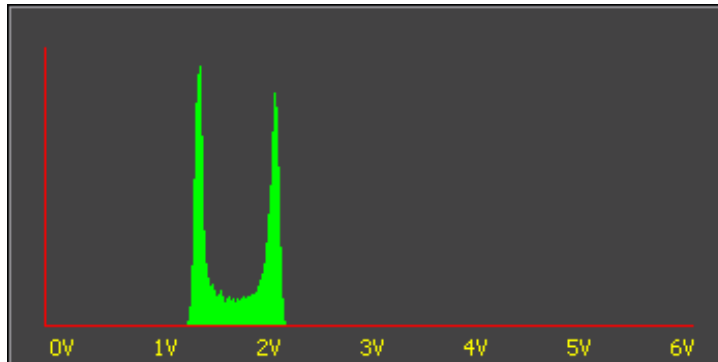


Figure 9: Histogram Indicating Good Timecode

The histogram in Figure 10 shows several spikes on the two peaks and a valley that contains a small peak. This indicates that there is a problem.

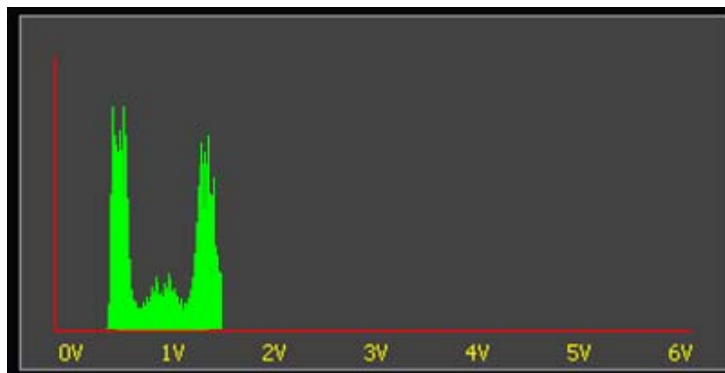


Figure 10: Histogram Indicating Poor Timecode

### 5.5.7 Summary List Panel

The Summary List displays information about each reel in a horizontal panel that runs across the bottom of the screen. It provides a running summary of the number timecode interruptions on each reel. It categorizes them as Minor, Intermediate, Major, and Critical. It also displays a grade for the reel and its status: pass or fail.

Scroll bars on the sides of the panel allow the user to scroll up and down the screen to view every reel in a session. Figure 11 shows the results of one reel.

Serial#	Reel#	Minor	Intermediate	Major	Critical	Grade	Date	Time
5051	4	3	1	1	0	D-Pass	15-Dec-06	06:58 PM

Figure 11: Summary List Box

### 5.5.8 Detail List Panel

The Detail List provides detailed information about each set of timecode interruptions that occur. It is displayed in a horizontal panel that runs across the screen below the Summary List. It lists the following:

- Serial and reel number
- Type of interruption
- Footage.frame point where the interruption began
- Footage.frame point where the code recovered
- Total duration of the interruption in frames
- Date and time the interruption occurred

Each line of information is color-coded to indicate its level of severity, from minor to critical. A sample Detail List panel is displayed in Figure 12.

Serial#	Reel#	Type	Interrupt	Recover	Duration	Date	Time
5051	4	Minor	19.12	20.09	16	15-Dec-06	06:58 PM
5051	4	Intermediate	25.07	26.12	27	15-Dec-06	06:58 PM
5051	4	Minor	35.11	36.06	14	15-Dec-06	06:58 PM
5051	4	Minor	37.08	38.04	14	15-Dec-06	06:58 PM
5051	4	Major	42.08	45.01	52	15-Dec-06	06:58 PM

Figure 12: Detail List Panel

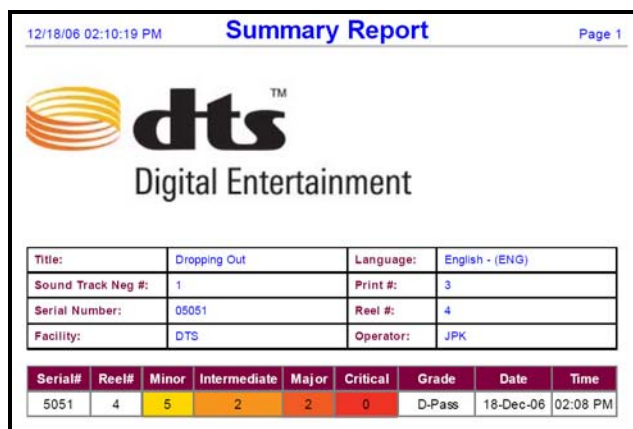
## 6. Reports

### 6.1 Types of Reports

The TCQC program generates two reports: the Summary Report and the Detail Report. The combination of these reports is called a Master Report. DTS requires a Summary Report for each approved negative.

**Summary Report:** This report provides a high-level view of multiple reels in a single film. It shows the number of timecode interruptions in the four categories (minor, intermediate, major and critical), a grade, and a rating of pass or fail.

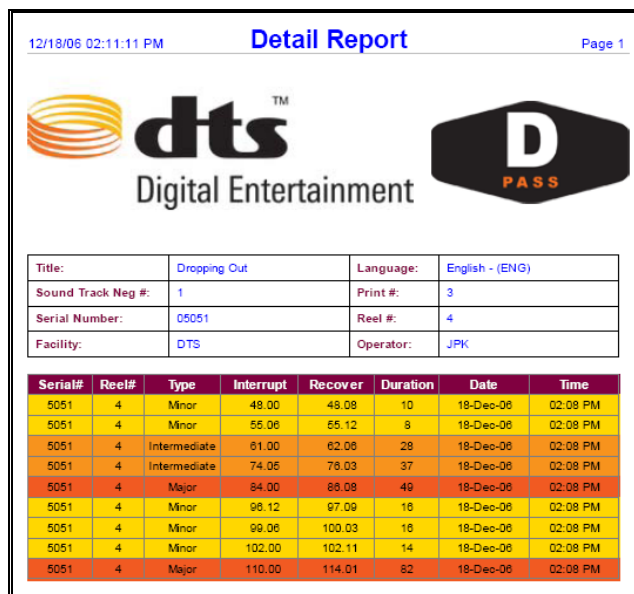
The Summary Report also provides basic identifying information, such as the serial number, reel number, and date and time the reel was tested. Figure 13 is an example of a Summary Report.



Serial#	Reel#	Minor	Intermediate	Major	Critical	Grade	Date	Time
5051	4	5	2	2	0	D-Pass	18-Dec-06	02:08 PM

Figure 13: Summary Report

**Detail Report:** The Detail Report shows the type, start, end, duration, date and time of each timecode dropout in a reel. It identifies each reel by serial number and reel number. Figure 14 is an example of a Detail Report.



Serial#	Reel#	Type	Interrupt	Recover	Duration	Date	Time
5051	4	Minor	48.00	48.08	10	18-Dec-06	02:08 PM
5051	4	Minor	55.06	55.12	8	18-Dec-06	02:08 PM
5051	4	Intermediate	61.00	62.06	28	18-Dec-06	02:08 PM
5051	4	Intermediate	74.05	76.03	37	18-Dec-06	02:08 PM
5051	4	Major	84.00	88.08	49	18-Dec-06	02:08 PM
5051	4	Minor	96.12	97.09	16	18-Dec-06	02:08 PM
5051	4	Minor	99.06	100.03	16	18-Dec-06	02:08 PM
5051	4	Minor	102.00	102.11	14	18-Dec-06	02:08 PM
5051	4	Major	110.00	114.01	82	18-Dec-06	02:08 PM

Figure 14: Detail Report

**Master Report:** A master report is simply the combination of the summary report and a detailed report for each reel tested in the session.

## 6.2 Save and Print Reports

Reports can be saved as PDF files and can automatically be printed at the end of each session by checking the Auto Print checkbox. (Figure 15).

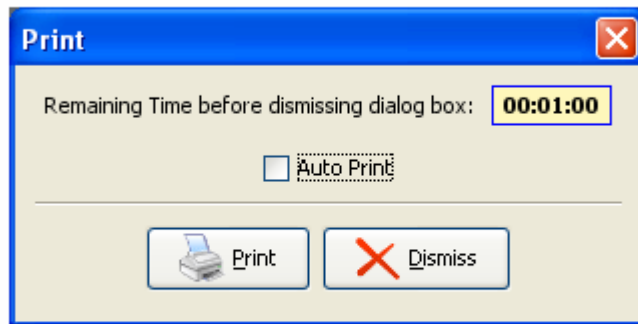



Figure 15: Print Dialog Box

This dialog box pops up at the end of each session or when the End Session Button  on the toolbar is pressed, giving the user a chance to print or dismiss the dialog box without printing.

### Summary and Detail Reports

To print a Summary Report or a Detail Report manually, click on the **File** menu and select **Print**.

## 6.3 End Current Session

When the last reel of a session is being checked and the reel is less than 36 minutes, there is normally an additional delay of 36 minutes, less the length of the reel. To end the current QC session immediately and save the last reel's data click the end current session button.



## 6.4 Print Media

DTS recommends selecting PDF writer as the default printer and printing to a PDF formatted file. The PDF files are saved in the film test archives for easy retrieval.

If printing to a printer, DTS strongly recommends a color printer. The test results are color coded, which makes color copies easy to read at a glance.

To print a hard copy of the report, use the Page Setup menu, which is accessed from the toolbar. The Page Setup screen is shown in Figure 16.

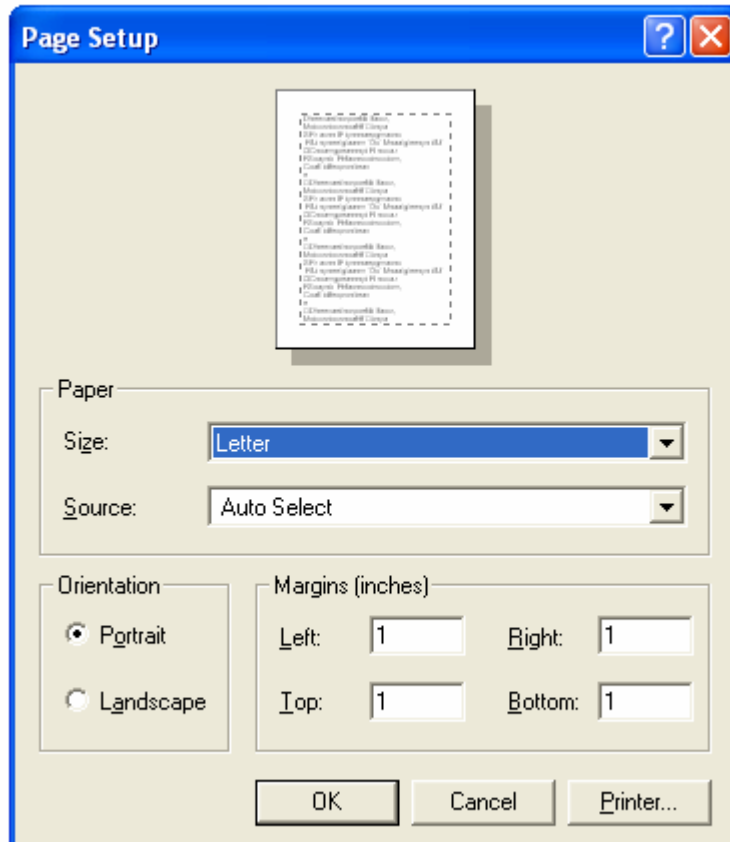


Figure 16: Page Setup Screen

## 6.5 Deliver Reports

DTS Post Production and Quality Assurance require a Summary Report for each approved negative for archiving purposes and to meet contractual agreements. DTS prefers to receive the reports in PDF format via email. Reports should be emailed to [postproduction@dts.com](mailto:postproduction@dts.com).

## 7. Retrieving Reports

The TCQC file structure makes it easy to retrieve reports based on information entered by the operator. The file structure for reports contains the three levels listed below.

1. Film folder
2. Session folder
3. Files

### 7.1 Film Folder

#### 7.1.1 Film Folder Name

The name of the film folder report is the film's unique serial number and title.

For example, if the film's serial number is 00001 and its title is “The Buzz and Bill Show”, the name of the film folder will be:

**00001\_Buzz and Bill Show**

### 7.2 Session Folder

#### 7.2.1 Session Folder Name

The name of the session folder includes the following:

- Language
- Soundtrack Negative Number
- Print Number
- Date

For example, if sessions were conducted on English versions for soundtrack negatives 1 and 2 to create Print 1 on the same day, the film folders would be named:

- **English\_STN1\_P1\_04JUL2005**
- **English\_STN2\_P1\_04JUL2005**

#### 7.2.2 Session Folder Path

The session folder can be accessed through the following path:

00001\_Buzz and Bill Show/English\_STN1\_P1\_04JUL2005

### 7.3 Files

Files are stored by reel in the session folders. The files have a .tqc extension and the filenames contains the following information:

- Reel number
- Date
- Time stamp

For example, reels one and two of a film could be named:

**R01\_04JUL2005\_04:20PM.tqc**

**R01\_04JUL2005\_04:45PM.tqc**

## 7.4 File Structure

An example of the structure of folders and files for the reels discussed in this section is shown in Figure 17.

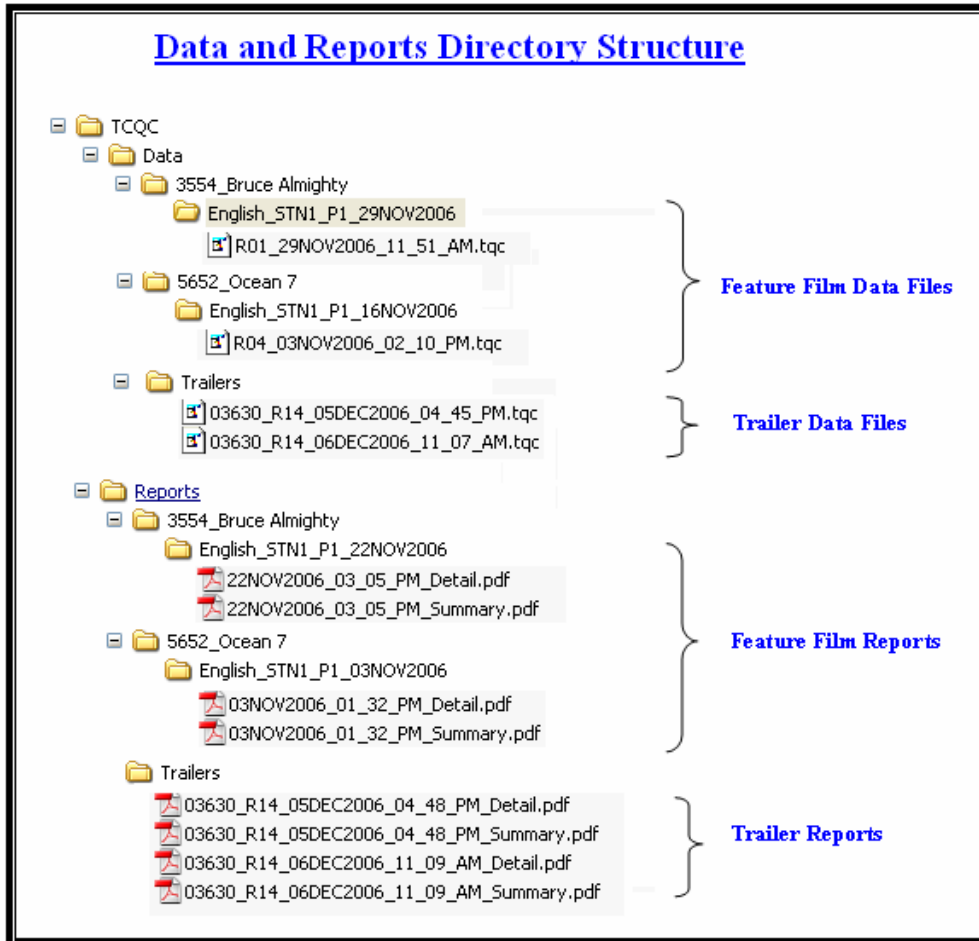


Figure 17: File Structure