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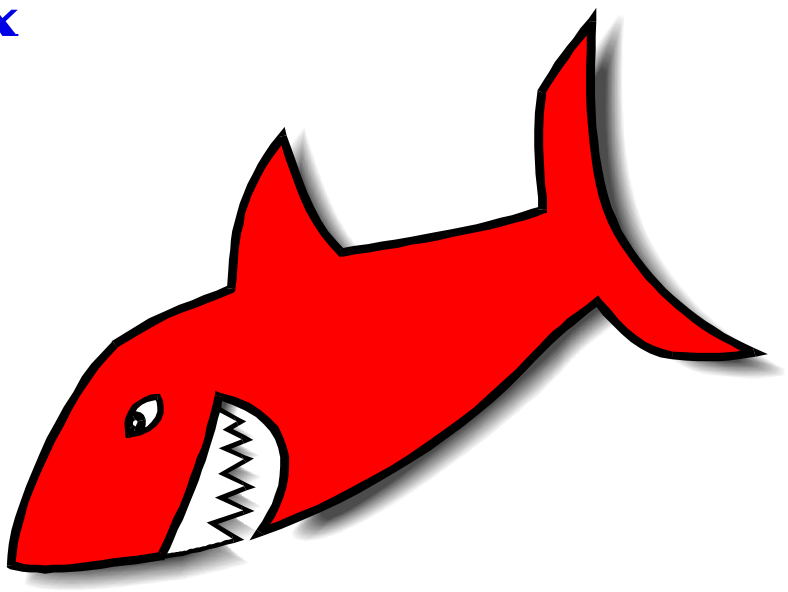

Lightworks

Solutions for Film Editing

(PAL Edition)

A Post-Production Primer for Feature Films

071-0085-00

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Table of Contents

1.0 Introduction

1.1 About This Document

This document is a guide to the process of editing a feature film at 24 fps using one of the Lightworks series of editing systems.

It outlines the principal post-production routes and explains the fundamental principles of digital non-linear editing as they apply to 24 fps feature films in the PAL world.

It is intended as a reference for producers, editors, assistant editors, sound editors and post-production supervisors.

Both the Lightworks and Heavyworks systems support true 24 frame editing. Where the text refers to Lightworks, it can be assumed that the reference also applies to Heavyworks, unless stated otherwise.

Information presented here applies to Version 6 software.

1.2 Basic Principles

The basic principles of digital post-production for film are actually very simple, and are essentially no different from those of traditional film editing and conforming.

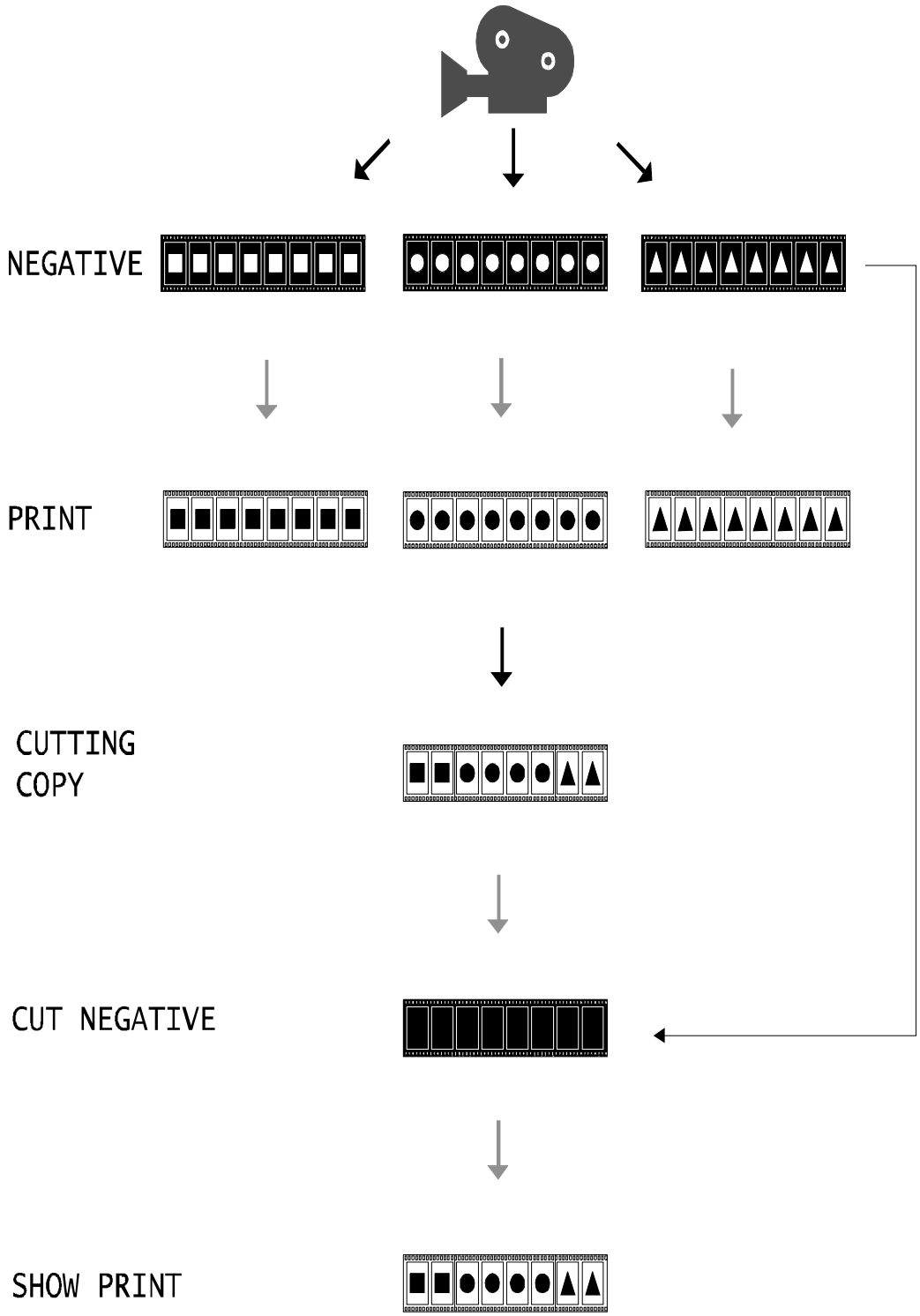
A good starting point is to summarise the traditional workflow on film:

- **Negative is shot in camera.**
- **Negative has edge numbers which provide every frame with a unique label.**
- **A print is made from the negative. The print also carries the edge numbers.**
- **The print is edited to produce a cutting-copy.**
- **Negative is cut to match the cutting-copy, using the edge numbers.**
- **A final show print is produced from the cut negative.**

This workflow is represented by the diagram on the following page.

The key to the whole process is that every frame should have a unique label to identify it. As long as this is true both for the original and the cutting copy, you can guarantee correct conforming.

These are exactly the principles used by the Lightworks system.



Traditional Workflow for Film Post-Production

1.3 Overview of Workflow on the Lightworks System

The following steps would normally be taken in order to edit a film on the Lightworks system:

1 Telecine transfer of film print/negative to video tape.

2 Create a database which notes the sync relationship between the various media (film, audio tape, and video tape) in terms of film edgecodes and video and audio timecodes.

Databases can be created at any of the following stages:

- **During telecine**
- **In an electronic sync suite**

  Sound is edited onto the mute video tape of picture rushes.
- **In the cutting room, using either the Lightworks system or separate PC**
- **A combination of the above**

3 Record video tape into the Lightworks system

The database can be converted to a Lightworks Logging Database and used to automate the recording of shots. At this stage, film edgecode and video/audio timecode are read into the Lightworks system and stored with each shot. This information is brought into the system from either the database or from the VITC, or a combination of both.

4 Edit on the Lightworks system.

5 Produce a film cutting list on the Lightworks system.

This is done using the Film Cutlist Tool. The Lightworks system produces a cutting list which expresses the cuts in terms of the film labels (Keycodes or Rubber Numbers) which were stored with each shot when it was recorded.

6 Print the cutting list.

7 Conform the cutting copy or negative using traditional methods.

► Note: It is not obligatory to produce film cutting lists on the Lightworks system. External film database systems such as OSC/R and Excalibur, which are often used by negative cutting facilities, can be utilised to track the film and video codes through this type of film post production. In this instance, Lightworks timecode EDLs are generated and passed on to the negative handing facility for conversion into film cutting lists.

8 Generate a Lightworks audio EDL and playout video tapes for sound editors.

1.4 Lightworks PAL 24 Project Standard

Feature films are generally shot and projected at 24 fps (frames per second). It is therefore preferable for editors of feature films shooting at 24 fps to use an electronic editing system in which editing and playback of material also occurs at 24 fps.

Film must be transferred to video tape before it can be recorded into a digital editing system, and in the PAL world video runs at a speed of 25 fps. Therefore, special methods are used during the telecine process to account for the difference in the frame rates between film and video. These methods will be explained in more detail later in this document.

The Lightworks Project standard PAL 24 allows for the recording of 24 fps film material from PAL video tapes, and provides an environment in which the frame rate for playback and editing is set at 24 fps.

The PAL 24 Project setting should be used by all productions who intend to shoot and edit at 24 fps.

2.0 Labelling Material

2.1 What Are Labels?

Any code that is used to identify picture or sound material (e.g. timecode, edge numbers, userbits etc.) can be described as a label.

Normally, electronic editing talks about these codes as separate entities. However, we have found that it is more helpful to describe them generically as labels.

Key numbers or rubber numbers on a cutting-copy are simply a way of marking frames. You could do it with a wax pencil. The same is true of timecode or VITC userbits on a video tape - they are simply marks that identify frames. Problems in electronic post-production for film have often resulted from the confusion of timecode with time. By thinking of it as a label, this confusion is avoided.

Provided you understand how to label your material properly, and how to get those labels into the Lightworks system, you should not encounter any problems with the accuracy of your film cutlists and EDLs.

2.2 Labelling Picture and Sound

2.2.1 Key Numbers

All film stock is labelled with key numbers (also known as edge numbers) which uniquely identify every frame. When the film is in the camera the key numbers are 'latent' and cannot be read. Once the film has been processed the key numbers can be read on the negative or print (either by human or machine).

Key numbers cannot be used to label sound.

2.2.2 Timecode

Timecode is a label that can be recorded onto video tapes and audio tapes. It is simply another frame labelling system, but one which also contains information about time. It can be used for both picture (e.g. the frames on a video tape) and sound (which has no frames per se, but can still be labelled as if this were the case).

Timecodes are not fully unique on their own, because they are based on a repeating 24 hour cycle. To make them unique, you must log extra information such as the tape reel number.

Sound can be labelled with timecode at the shoot, if a timecode Nagra or DAT machine is used. *See section 2.3 Audio Timecode Standard*.

2.2.3 Film Timecode

The most sophisticated film timecode (or 'camera code') systems use in-camera labelling. In these cameras, a unique code is recorded on the negative at the time of shooting.

In the Aaton system, for example, the code carries:

- **Time-of-day (to the frame)**
- **Date**
- **Camera number**

Each frame shot is therefore uniquely labelled and identifiable, even in multi-camera shoots.

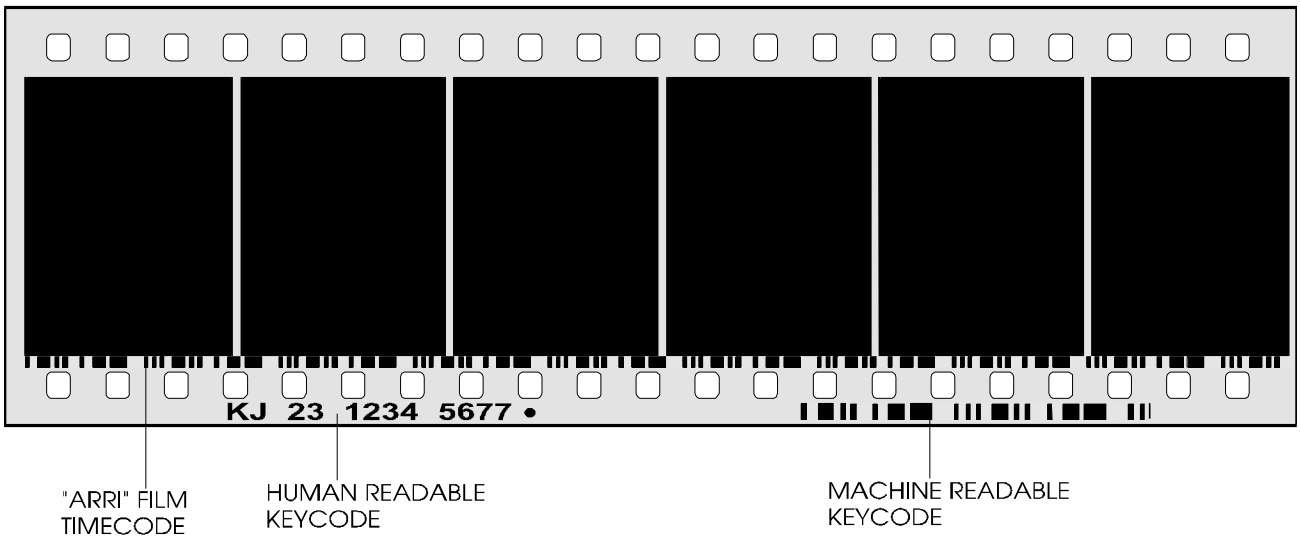
In camera code systems, the time-of-day code is also recorded on the matching sound-tape. Provided this also carries a date (which makes each timecode hour unique, in the same way as a roll number), a single label can be used both for automated syncing-up, and for conforming picture and sound.

The timecode standard for film timecode is determined by the camera speed. If film is shot at 24 fps, then the timecode standard for both picture and audio will be 24 frame timecode.

2.2.4 Rubber Numbers (Acmade/Ink Numbers)

If picture and sound are synced-up in the conventional way using 16mm or 35mm print and mag, the sync rolls will be stamped with rubber numbers (also known as Acmade code or ink numbers). These are normally used to help maintain sync during traditional film cutting.

The following diagram shows examples of some of the labels that can exist on a piece of film.



35mm Film Showing Some of the Possible Labels

2.3 Audio Timecode Standard

Most productions will want to conform audio from an EDL created on the Lightworks system. This can be done using either:

- **The original audio timecode**

  In this case provision must be made to maintain the accuracy of the original label through a variety of transfer or syncing routes, first to the Lightworks system and then, in many cases, to a Digital Audio Workstation.

  or

- **A new timecode**

  This is generated during the telecine transfer, or in an electronic sync suite: e.g. through the use of copy DATs, which use timecode identical to that of the rushes video tape. It is preferable for the purposes of an auto-conform for the sound rushes to be labelled with continuous timecode.

Audio timecodes can be read into the Lightworks system from a Logging Database, from VITC, or from LTC (if an audio-only recording).

There are two timecode standards in use for labelling audio for films in the PAL world: 24 or 25 frame timecode. In the majority of cases, 25 frame timecode is used, since Digital Audio Workstations generally require a 25 frame timecode EDL for an autoconform.

Productions using 24 frame film timecode systems for automated syncing-up (either in telecine or on the Lightworks system) must therefore find an alternative route for audio post-production. If the Lightworks Pro-Sound option is used, then audio tracks can be passed on to sound editors without the need for an audio EDL. *See section 8.4 Transferring Pro-Sound tracks to a Digital Audio Workstation.*

➤ Note: Timecode standard is independent of tape speed. Hence in discussions of timecode standard, ‘24 or 25 *frame* timecode’ is the correct expression, as opposed to ‘24 or 25 *fps* timecode’, which is incorrect.

3.0 Telecine

3.1 Transfer Type

There are two telecine methods available for transferring film shot at 24 fps to PAL video tape, which runs at 25 fps. Each method is defined by the speed at which the film is run on the telecine machine. Both methods allow true 24 frame editing on the Lightworks system.

It is important to remember that the choice of telecine transfer type has implications for the syncing up process. *See section 4.0 Synchronising Picture and Sound*

3.1.1 Straight Transfer

In a straight transfer, film which has been shot at 24 fps is run 'fast' at 25 fps on the telecine machine, creating a 1:1 relationship between film frames and video frames.

This represents a speed change of +4% over the speed at which the film was run in camera.

The Lightworks system can be set up to internally 'speed correct' the frame rate of a 25 fps transfer after the tape is digitised.

3.1.2 Pulldown Transfer

In a pulldown transfer, film which has been shot at 24 fps is run at 24 fps on the telecine machine, using PAL Pulldown.

The PAL Pulldown scheme compensates for the difference in frame rates between the telecine machine and the video tape, which is running at 25 fps. During the transfer, at 12 frame intervals, a video field is duplicated and recorded onto the video tape.

With the emergence of the 3-Line VITC standard for telecine transfers it has become possible to record film label information as part of the video signal. If 3-Line VITC is used with a pulldown transfer, the Lightworks system can automatically identify where the duplicate fields are located as it reads film labels from the VITC during recording. This is known as 'auto-sequence detection'.

Using pulldown transfers it is possible to maintain pictures and sound at native rate from video tape rushes through to the Lightworks edit and audio post-production. Audio sync is easy to achieve and film labels can be tracked easily and accurately.

See section 7.5.1 for more information about 3-Line VITC.

Film Frame	A		B		C		D		E		F		G		H		I		J		K		L		M	
Video Fields	A 1	A 2	B 1	B 2	C 1	C 2	D 1	D 2	E 1	E 2	F 1	F 2	G 1	G 2	H 1	H 2	I 1	I 2	J 1	J 2	K 1	K 2	L 1	L 2	L 3	M 1
Video Frame	:00		:01		:02		:03		:04		:05		:06		:07		:08		:09		:10		:11		:12	

Film Frame	N		O		P		Q		R		S		T		U		V		W		X				A	
Video Fields	M 2	N 1	N 2	O 1	O 2	P 1	P 2	Q 1	Q 2	R 1	R 2	S 1	S 2	T 1	T 2	U 1	U 2	V 1	V 2	W 1	W 2	X 1	X 2	X 3	A 1	A 2
Video Frame	:13		:14		:15		:16		:17		:18		:19		:20		:21		:22		:23		:24		:00	

The PAL Pulldown Sequence
Showing 24 Frames of Film and Their Corresponding Video Fields and Frames

3.1.3 General Notes on Telecine

The type of telecine transfer must be agreed by the relevant production and crew members at the earliest possible stage and communicated to the telecine house by the Lightworks assistant or post production supervisor. The most commonly used transfer method to date has been the straight transfer.

Using the pulldown method means that the audio complications of a straight transfer can be avoided (the sound remains at its native rate throughout post-production). However, the technology which makes it feasible for use in film editing is fairly new. If the pulldown option is chosen, then it is preferable to go with a telecine house which has experience in doing this type of transfer.

► Note: Do not attempt to combine both types of transfer in a single Lightworks Project.

4.0 Synchronising Picture and Sound

4.1 Introduction

At the time of shooting, picture and sound are recorded on separate media. The way in which they are synchronised after the shoot is very important.

Syncing-up can take place at any one of the following stages:

- **Before telecine**
- **During telecine**
- **After telecine in an electronic sync suite**
- **At the time of digitising ('chase-sync')**
- **In the Lightworks system**

4.1.1 Syncing Sound to 25 fps Straight Transfers

There are two problems involved in syncing sound to straight transferred material:

1. Increasing the speed of the sound to 25/24 times its native speed to sync with the fast picture.
2. Preserving the accuracy of audio timecode labels.

   It is not technically difficult to speed up sound accurately and maintain sync with 25 fps picture. The difficulty lies in keeping hold of the original location 1/4 inch or DAT audio timecode. Some of the solutions to this problem are described in the following sections.

4.1.2 Syncing Sound to Pulldown Transfers

Syncing audio to a PAL pulldown transfer of picture is more straightforward than syncing to a straight transfer since in this case there are no speed changes involved for either picture or sound.

4.2 Sync-up before Telecine

This is the most common method of working for Hollywood feature films. It allows both for rushes screenings and the conforming of a workprint to match the electronic cut.

Audio timecode from the location 1/4 inch or DAT tapes is retained during sound transfer to magnetic stock. Film rush print and mag are synchronised in the film cutting room using conventional methods. The sync rushes rolls are then rubber numbered.

During the telecine transfer, rubber number and audio timecode labels are recorded in a database and also burnt in to picture.

In a PAL straight transfer scenario, rushes rolls are transferred fast at 25 fps, which means that any audio timecode on the mag will be running fast. This timecode can be noted in a telecine database and also burnt into picture.

► Note: In the case of 25 frame timecode it will not be possible to encode the signal into VITC since there will be 26 counts per second instead of 25.

In a PAL pulldown transfer scenario, rushes rolls are transferred at rate of 24 fps. Sound remains at native rate throughout post-production.

4.3 Sync-up in Telecine

The following methods can be used with either straight or pulldown transfers:

4.3.1 Using Film Timecode

24 frame film timecode is recorded onto both film and audio tape at the time of the shoot. It is then possible to sync up during telecine by chase-syncing audio equipment to the timecode output of the telecine machine.

In both cases, the transfer video tape will be labelled with a fresh continuous 25 fps time-code, since the film timecode contains discontinuities between takes.

► Note that 24 frame film timecode is not suitable for productions wanting to conform audio from an audio EDL. *See section 2.3 Audio Timecode Standard.*

If pulldown transfers are being used, then the copy DAT method provides a convenient way of replacing the original 24 frame audio timecode with new continuous 25 frame timecode. *See section 4.7 Copy DATs*

4.3.2 Using Electronic Slate Boards

This approach utilises the audio timecode display of an electronic slate board.

Location sound is recorded onto DAT using 25 frame timecode. This timecode is displayed on the electronic slate board and can be read by the telecine operator during rushes transfer. The operator manually enters the start audio timecode for each take into the telecine controller (e.g. the Aaton Keylink).

This timecode is then sent to a DAT machine running the location DAT. As the transfer is made, the DAT player chases the timecode output of the telecine machine, and its output is recorded onto video tape in sync with picture.

In the case of a straight transfer, the timecode output of the telecine machine will be ‘fast’, therefore the audio equipment needs to be capable of handling the +4% speed change while in chase-sync mode.

The advantage of this method for a straight transfer is that it allows for both a burn-in and a database entry for audio timecode.

4.4 Sync-up after Telecine in an Electronic Sync Suite

This is a reliable, efficient and cheap method of syncing rushes. Sound is added to the mute rushes video tape after telecine, making use of conventional slates, electronic timecode slate boards or film timecode. The syncing up operation is carried out by using one of the following:

- **An analogue tape machine (e.g. timecode Nagra)**
- **A DAT machine or other digital audio tape machine**
- **A hard disk recorder (e.g. SADIE)**

There is often no automatic way of adding the original audio labels (timecode and sound roll number) to a database. This process is more difficult in the case of straight transfers because of the speed change involved. Systems for maintaining audio labels vary from one facilities house to another, so it's best to shop around.

If the pulldown route is being used, then copy DATs are a convenient way of by-passing the problem of retaining original audio labels. *See section A4.7 Copy DATs*.

4.5 Sync-Up when Recording into the Lightworks System

The 'chase-sync' approach has been used principally as a means of getting professional quality audio into the Lightworks system.

Copy DATs are created with timecode which matches the rushes video tape created in telecine. Recording into Lightworks takes place with a DAT machine chasing the VTR timecode. Lightworks records audio from the DAT rather than the audio tracks on the video tape.

With the arrival of new video tape formats such as Digital Betacam, which provide pro-quality digital audio, it is no longer necessary to use this method in order to utilise Lightworks' Pro Sound capability. However, it still remains an option for productions using cheaper video tape formats, such as Hi-band U-matic, which has relatively poor quality analogue sound tracks.

This is a convenient method for use with pulldown telecine transfers.

The situation is more complicated for straight transfers, where the audio on the DAT will be running fast. This means that analogue inputs must be used from the DAT machine, in order that the fast audio can be slowed down to its native rate. It is not possible to slow down digital audio while recording into the Lightworks system

A second complication of having fast audio on the copy DAT is that any autoconformed sound will run faster than the projected film. However, sound on the Lightworks system runs at the correct speed for syncing to the projected film, so if Pro Sound is being used then audio tracks can be output for use on a Digital Audio Workstation. This can be done using either playouts to a digital tape format, or by transferring sound files directly using the OMFI2 or WAV file conversion feature.

4.6 Sync-Up in the Lightworks System

This approach avoids the problem of having to increase audio speed in order to sync-up with a straight transfer on video tape.

In this case, telecine video tapes will be mute. Sound is recorded into the Lightworks system at native rate, and will sync to picture without any adjustment.

Sync rushes will only exist on the Lightworks after syncing up has taken place. A fast playout of the sound can be performed to put sync sound back over the mute video tape. However, this adds significantly to the workload of the cutting room, and ties up the Lightworks system when it might otherwise be used for editing.

Syncing-up can be done in Lightworks system using the Auto Synchronise Gallery command, or on a shot-by-shot basis using the Synchroniser Tool.

This automated sync-up feature utilises film timecode, which is common to both picture and sound rushes. *(See section 2.3 on Audio Timecode Standard for a discussion of the implications of using 24 frame timecode).*

This method can also be used with pulldown transfers if required.

4.7 Copy DATs

Audio timecode recorded on the set (which is discontinuous) can be replaced with new continuous timecode if copy DATs are made during the syncing process.

Usually, the copy DAT will have continuous timecode identical to that of the rushes video tapes made during the telecine transfer. Using this method it is possible to create an audio EDL based on the video timecode.

4.7.1 Using Copy DATs with Straight Transfers

It must be stressed that the drawback of using this method with straight 25 fps telecine transfers is that the conformed sound is running faster than the projected film and will not sync up with it. In this case provision needs to be made to slow the conformed sound down again.

4.7.2 Using Copy DATs with PAL Pulldown Transfers

The copy DAT method can be used more readily with pulldown transfers. In this case the speed of the sound is not altered and so the copy DATs will be running at the same speed as the film when projected at 24 fps. This makes it easier in terms of not having to track original audio labels.

4.8 Electronic Slate Boards

Electronic slate boards display audio timecode on an LED panel. A number of facilities are syncing rushes, usually in a small sync suite, by using electronic slate boards as the sync reference. This is proving to be a successful and cheap option for syncing, however its accuracy depends on careful work both on the set and by the sync facility.

4.9 Sound Transfer Speeds

It is common to hear post-production staff talking about ‘24 fps transfers’ or ‘25 fps transfers’ as a way of differentiating between transfer speeds. A ‘24 fps transfer’ would be one at which the audio is run at its native rate (i.e. the speed at which it was recorded). A ‘25 fps transfer’ would be a ‘fast’ transfer, where the audio is speeded up by 4% (25/24 fps).

This way of talking has caused a certain amount of confusion. The confusion centres around 24/25 frames per second as an expression of rate or speed and 24/25 frame *timecode* which is *not* an expression of rate or speed.

The location sound tape might carry either 24 or 25 frame timecode. It is better, therefore, to describe the transfer speed in terms of its taking place at ‘native rate’ or ‘fast by 4%’ when talking to sound transfer bays or syncing facilities.

4.9.1 ‘Sync Locking’ During Sound Transfers

Great care should always be taken when transferring audio between timecoded analogue audio media (Nagra 1/4 inch and mag) and digital media (DAT and Hi-DAT).

Loss of sync can occur due to incorrect referencing of the machines involved in any transfer process. In the PAL world, 25 frame timecode is generally used as the sync 'resolver'. Therefore the normal reference signal will be a PAL video reference signal, to which the source and the destination machines are locked for transfers.

The most common problem occurs when transfers are made from Nagra 1/4 inch to DAT. The playback machine has to be capable of 'sync locking' or resolving to its own recorded timecode. This requires the use of external resolving equipment for most location Nagra machines, and it requires studio machines to have the right options fitted (speak to your supplier). It is not sufficient to just press 'play' on a mains locked 1/4 inch studio machine.

4.10 Maintaining Sync with Material Shot at 25 fps

There are often occasions when a 24 fps production will need to shoot at a different frame rate for technical reasons. For example, it is often necessary to shoot at 25 fps in order to synchronise with video monitors or computer screens (usually faked with a PAL video signal) that may appear in shot. This is a straightforward matter for the cutting room provided that the material is mute. However, if sync sound is involved, the process becomes more complicated.

Consider the following two cases in which a 24 fps production has shot sync material at 25fps. The production is using straight telecine transfers for its 24 fps material:

- **Case One**

  The material is telecined mute at 25fps and recorded into a PAL 24 Project set up for straight transfers. The picture will be slowed down to play back at 24fps. The sound is then digitised into the Project at its native speed and will be played back at its native speed. In this case, the picture and sound will NOT sync.

- **Case Two**

  The material is telecined with the sound in sync at 25fps. This material is recorded into a PAL 24 Project set up for straight transfers. The playback of this material will be in sync since both the film and the sound are slowed down to 24fps. However, when the sound is conformed it will NOT sync with the film.

The correct way to deal with this type of material is to slow down the original sound by 24/25 and copy it onto a new medium (e.g. DAT). This new slowed sound should then become the production sound since its speed will now match that of the slowed down picture when it is projected.

If 24 fps pulldown transfers are being used throughout, then the 24/25 slow down is automatically achieved. However, it will still be necessary to create a production quality copy of the slowed down sound onto a separate medium for use in audio post-production.

5.0 Options for Rushes Projection

The most straightforward approach to providing sync rushes that can be projected is to sync-up print and mag in the conventional way prior to telecine. However, not all feature projects will want to take this route because of the potential costs involved. There are some other options worth considering for rushes projection.

5.1 Option A

If the PAL pulldown transfer route is being used, then audio is at native rate at every stage. Therefore any DAT which has been created during the syncing up process (either in telecine or in a sync suite) will sync not just to the video tape but also to the corresponding rushes print roll (or a print made from the corresponding lab roll, if a neg transfer production).

This DAT could be transferred to mag and projected with the rushes print roll, thus saving on mag cost as the location audio will not all have to be transferred to mag stock. Further savings could be made by re-using the mag stock, as it is only to be used for rushes viewings.

5.2 Option B

A rushes DAT could be locked to a film projector by the use of a timecoded mag roll. In this case a mag roll is pre-striped with known timecode (e.g. 10:00:00:00) at a sync point, and any offset between this and a sync point on the DAT is set into a chase-sync capable DAT machine, which will then lock-up to the projected print.

This is technically more difficult, but has the potential for even greater cost savings with regard to magnetic stock.

5.3 Option C

A similar method has been used for projection in straight transfer scenarios where 'fast' audio exists on a 25 frame timecode DAT, created in a straight transfer route. In this case, 25 frame timecode was recorded onto a mag roll running 4% fast (i.e. 25/24 fps). This roll is then run against the 24fps print i.e. running 'slow' - and the DAT is set to chase mode. The DAT will chase 'slow' (24/25) provided that the speed change is within the window of the vari-speed capability of the DAT machine.

6.0 Recording Rushes into a Lightworks PAL 24 Project

The first step that you must take on the Lightworks system prior to recording your rushes is to determine the settings for the Lightworks Project in which editing is to take place.

The PAL 24 Project setting should be used by all productions who intend to shoot and edit at 24 fps, regardless of whether the telecine transfer of rushes has been done at 24 fps (pulldown) or 25 fps (straight).

6.1 Recording Rushes into a PAL 24 Project

The Recording Parameters Panel is used to record information about the kind of material to be recorded into the Lightworks system.

The following table shows some of the possible material and Project types, and the appropriate settings for the Recording Parameters settings **Transfer Type** and **Audio Sync'd To:**

Shooting Rate	Transfer Rate	Chans	Project Standard	Transfer Type	Audio Sync'd to	Comments
24	25	VA	PAL24	Straight	Video	The Lightworks system performs 24/25 speed correction for video and audio
24	25	V	PAL24	Straight	Video	The Lightworks system performs 24/25 speed correction for video
24	25 (V)	A	PAL24	Straight	Audio LTC / Freerun	Native rate audio (no speed change) - will sync in Lightworks with 24 fps picture.
24	24	VA	PAL24	Pulldown	Video	Requires 3-Line VITC

The **Transfer Type** setting is used to give the system information about the type of telecine transfer.

- **Straight**: Recording from a Straight Transfer (25 fps)

  Lightworks will digitise every frame from the 25 fps transfer and then adjust playback to 24 fps.

  Fast (25/24) audio is slowed down to its original speed by over-sampling at 50kHz and adjusting playback to 48kHz (this is 48/50 or 24/25 times its native rate).

■ **Pulldown**: Recording from a Pulldown Transfer (24 fps)

The most convenient way of detecting the duplicate fields in the PAL pulldown sequence is to have the telecine put keycode information into the VITC of the video signal. The duplicate fields can then be automatically identified by the Lightworks system.

The Lightworks system can be configured to read labels from VITC using the Label Mapping Panel.

It is also possible to record from a pulldown transfer by working out the sequence number and manually entering it into either the Sequence field of the Logging Database, or the corresponding field in the Record Parameters Panel.

➤ Note: In practice problems have occurred through incorrect set-ups on telecine machines. Most commonly the Keycode in the VITC repeats at a different place to where the picture repeats, causing the wrong frame to be discarded. In cases such as this, the only remedy is to have the material sent back to telecine to be re-transferred.

➤ Note: Other problems can arise from mixing both pulldown and straight transferred material in the same Project or edit. This should not be attempted.

See the Lightworks User Guide for more information about recording.

7.0 Tracking Labels from Telecine to the Lightworks System

7.1 Introduction

Labels required for film cutlists and/or EDLs must be accurately maintained through the processes of transfer, syncing, and recording into the Lightworks system.

For picture, it is essential that you have:

- **Video tape timecode and reel ID**
- **Keycode or rubber numbers**

And, optionally:

- **Film timecode (plus camera roll or date)**

For sound, it is essential that you have:

- **Audio timecode and sound roll number (may match video timecode and reel ID if using copy DATs)**

And, optionally:

- **Rubber numbers**

There are two basic methods for getting this label information into the Lightworks system:

7.1.1 Label Information Noted in Database

A database is created which describes the sync relationship established between the various media (film, audio tape, video tape) during the process of telecine and syncing-up. This relationship is noted in terms of the film edgecodes and video/audio timecodes which are used to label each of the different media.

A database is created either during the telecine transfer or later on a PC.

The database provides the Lightworks system with the picture and sound label information that is required for generating cutting lists and EDLs.

7.1.2 Label Information Recorded onto Video Tape

All the labels that are needed are recorded onto video tape, either in LTC and/or the VITC area of the video signal. The Lightworks system decodes the labels, and stores them internally.

The encoding of picture and sound labels into the VITC area of the vision signal has become more common with the emergence of the Aaton/Evertz 3-Line VITC standard.

7.2 The Telecine Database

In most cases a database will be created during the telecine transfer. This will note each shot as a separate ‘event’ in a list, and will note each of the relevant labels at a sync point (usually the start time) for each one.

There are several telecine database products in common use. They include:

- **Aaton (Keylink)**
- **Evertz (Keylog)**
- **FLEx**

Any of the above databases can be converted to a standard Lightworks Logging Database *(See the Lightworks User Guide for information about telecine database conversion utilities).*

The Lightworks Logging Database may be used to:

- **Control automatic recording of shots into the Lightworks system**
- **Provide references to film edge numbers for producing cutting lists**
- **Provide references to audio timecodes to produce audio EDLs**

7.2.1 Adding Sound labels to the Telecine Database in a Sync Suite

If sound is to be added to the video tape after the telecine transfer has taken place, it is important to establish whether the sync facility intend to add sound labels (timecode and roll number) to the telecine database. Some sync suites are able to automatically track sound labels during the syncing up process.

If sound labels are burnt into picture, then the information can be added to the database by hand. If this method is used then it is important to verify the accuracy of the burn-in.

7.2.2 Modifying/Correcting the Telecine Database in a Cutting Room

It is often necessary for the Lightworks assistant to modify or add information to database when it arrives from telecine and/or the sync facility. This work may include:

- **Adding information about shots**

  Such as slate/take, scene number, sound roll, audio timecode, description and notes.

- **Modifying the list of shots**

  For example, if the telecine operator has created too many or too few events in the database (this is a common error). In cases where an assistant has to set a new start timecode for a shot, special care must be taken to update the corresponding film labels and audio timecode labels.

- **Keeping databases up to date and using print-outs as a non-linear cutting room ‘code book’**

Labels can be easily corrected on the Lightworks system after shots have been recorded However, it is generally better practice to have a clean and accurate database prior to recording. Accurate databases and database print-outs constitute an essential cutting room reference for the Lightworks assistant. These should be kept up to date with any corrections made to labels on the Lightworks system.

7.2.3 Changes in Telecine Logging Database Formats

Some film databases now support concurrent keycode and rubber number fields. The Lightworks film Logging Database supports both of these fields, in addition to other extra fields for reel identification e.g. ‘Comp Reel’ and ‘Lab Reel’.

➤ Note: Comp reel and lab reel information is not accessible from the Viewer Labels Panel on the Lightworks system.

7.3 Creating a Database in the Cutting Room

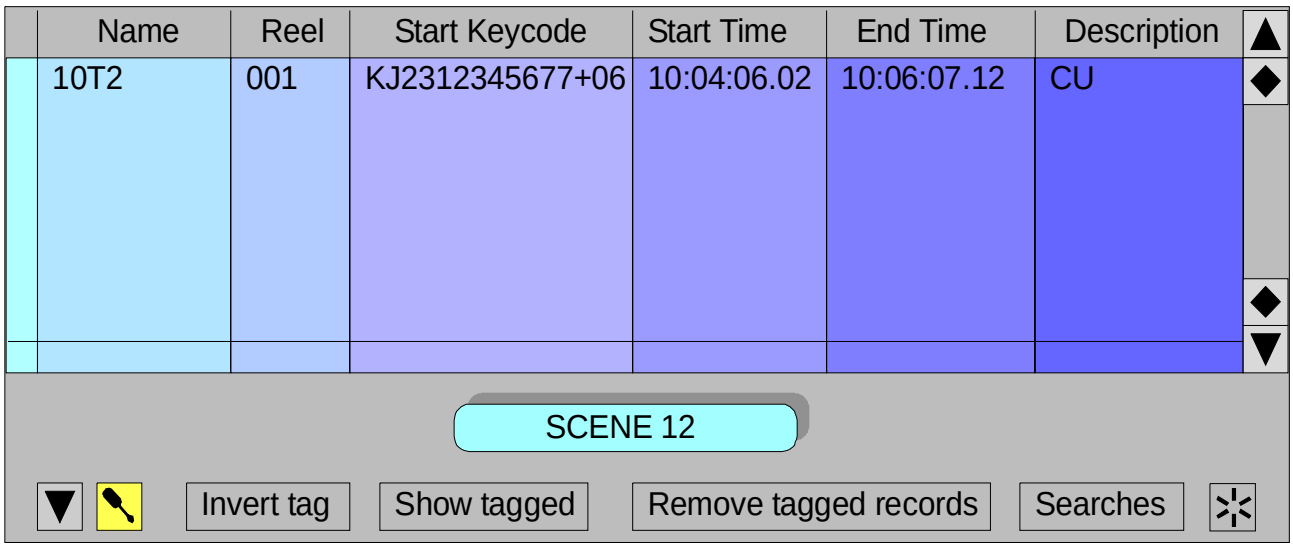
While it is preferable for the cutting room to be supplied with an automatically created database, it is not essential. If a telecine database is not available but the video tapes contain burnt-in labels, then it is possible to create a database on the Lightworks system, or on a PC using a logging program.

The database can be created using a Lightworks Logging Database template. The minimum information required to create an event in this database is:

- **Reel Number**
- **Start Timecode**
- **End timecode**

And, if a cutting list is to be generated from the Lightworks system:

- **Start Keycode or Start Acmade (rubber number)**



A Lightworks Logging Database

Film label information can be entered from the burn-in on the source video tape. Timecode can be read into the database automatically from the tape.

Usually a separate event is created for each take. In this way they are automatically recorded as separate shots on the Lightworks system.

However, strictly speaking, only one database entry is required for a each continuous run of labels i.e. each rushes roll or camera roll. Each roll will then be recorded as a single shot which can be broken up into separate takes on the Lightworks system.

7.3.1 Setting Up an Assistant Station for Database Work

Lightworks telecine database conversion utilities can be installed on a PC to run under Windows, or from DOS. However, certain modifications need to be made to the directory and file structure of the PC before the programs will run.

The following instructions assume that the reader has a basic knowledge of MS-DOS.

1 The relevant Lightworks database conversion program file must be copied from the system drive of the Lightworks System. The program files are found in the C:\LWORKS (or C:\HWORKS) directory:

FLEX.EXE

KEYLOG.EXE

It is also necessary to make a copy of the CONFIG.DAT file, located in the same directory.

2 Make a C:\LWORKS directory on the PC.

Copy the program file and the CONFIG.DAT file into this directory.

3 Create a ‘dummy’ Project directory on the PC.

Do this by making a c:\lwproj directory, and then a sub-directory of this called P0001000. This file path mirrors that of the default Project directory on the Lightworks system. This creates a ‘dummy’ Project to which the converted telecine databases can be written.

4 Using a floppy disk, copy c:\lwproj\p0001000\p0001000.ed2 from the c:drive of Lightworks system into the corresponding directory on the PC.

This tells the Flex or Keylog programs that the directory is a genuine Project (even though it isn’t).

➤ Note: It is not absolutely necessary to use a directory ‘cookie number’ of P0001000 - this is used only as an example. It is possible to use any Project ‘cookie’, provided that there is a matching Project .ED2 file present in the directory.

5 Telecine databases converted using the Flex or Keylog programs can now be saved as Lightworks Logging Databases to this dummy Project.

Programs such as the Lightworks Assistant can also be configured to save or read files automatically to or from this directory.

7.4 Adding Label Information to Shots Using Autochop and Retrofit

7.4.1 Autochop

The Autochop feature uses a Logging Database (which contains start and end timecodes) to break down a long recording (e.g. equivalent to a lab roll or sync rushes roll) into separate takes. The main film application for this is where material has been digitised directly onto disk at the telecine stage - usually onto a Lightworks Digistation.

In this case, a database is produced simultaneously with the telecine transfer to disk. The Autochop function will take the converted telecine database and chop the continuous recording into individual 'Ghosts' within the Lightworks system. Label information and other logging information is added to the Ghosts simultaneously.

See the Lightworks User Guide for more information about Autochop.

7.4.2 Retrofit

Retrofit is similar to Autochop, in that it uses a logging database to enter information and labels into shots after they have been recorded into the Lightworks system. It differs in that it does not create sub-sets of existing shots, it simply adds information to existing ones. This can be used to either create a copy of the shot or modify the original.

The use of the Retrofit feature might also involve material which has been recorded onto disk using a Digistation, but in this case as individual shots. Concurrently, or after the event, a database is created which contains label and other logging information relevant to the shots. This information can be added to the shots on the Lightworks system using Retrofit.

See the Lightworks User Guide for more information about Retrofit.

7.5 Recording Label Information from Video Tape

7.5.1 The 3-Line VITC Standard

Vertical Interval Timecode, or VITC, occupies the vertical interval region of the video signal, which is outside of the picture area. The Aaton/Evertz 3-Line VITC standard allows for the encoding of timecode and other label types into three consecutive video lines in the vertical interval.

The three lines contain the following labels

- **First line: video timecode**
- **Second line: keycode (or rubber numbers)**
- **Third line: audio timecode or film timecode**

In the PAL world, the 3-Line VITC standard allows for the use of any three consecutive lines in the range of lines 14 to 23. Lines 16, 17 and 18 are the most commonly used with the Lightworks system.

A VITC Test Panel can be generated from the Recording Panel Commands menu on the Lightworks system. This will identify whether 3-Line VITC is present on the video tape and indicate which lines are being used. This can be useful when defining a Label Mapping Set if the VITC line information is unknown. (*See section 7.5.3 for more on Label Mapping).*

The VITC Test Panel is only capable of showing which lines are being used for 3-Line VITC and is not capable of any detailed code examination. Speak to your telecine house for more detailed information regarding the content of the VITC.

The 3-Line VITC specification can be downloaded from the Aaton WWW site at http://www.aaton.com.

➤ Note: If the Lightworks system is set up to read 3-Line VITC labels from the source video tape, and recording takes place using a Logging Database, then the VITC labels will take priority over any corresponding labels contained in the Logging Database.

7.5.2 3-Line VITC and PAL Pulldown

Use of 3-Line VITC with pulldown transfers allows for automatic detection of the pull-down sequence. (*See section 3.1.2 Pulldown Transfer).*

Problems can occur if there is a discrepancy between the pulldown sequence and VITC labels. Labels will be inaccurate and playback on the Lightworks system may show repeat frames. Video tapes which have this problem should be returned to telecine to be transferred again.

7.5.3 Using Label Mapping Sets in PAL 24 Projects

A Label Mapping Set determines which labels are saved with a shot when it is recorded onto the Lightworks system. The Label Mapping Panel, which is accessed from the Recording Panel Menu, is used to define, save or load Label Mapping Sets.

It will sometimes be necessary to define a Label Mapping Set according to the specific requirements of a particular production. There are a number of standard label mapping sets that can be loaded, and, if necessary, adapted for use with PAL 24 Projects:

- **NORMPAL**

  This is the default Label Mapping Set for all PAL and PAL 24 Projects. It assumes that all channels will be recorded (V, A1, A2) with 25 frame video timecode from LTC.

If 3-Line VITC is being used:

- **P0001R1**

  For 16mm straight transfers. Recording controlled by breaks in film timecode (‘camera code’)

- **P0001R2**

  For 35mm straight transfers. Recording controlled by breaks in film timecode (‘camera code’)

For pulldown transfers using 3-Line VITC, load either P0001R1 or P00001R2, and change the Recording Parameters setting from **Straight** to **Pulldown**. Then save the Label Mapping Set under a different name.

For instructions on how to make changes to the Record Control Label see the Lightworks User Guide.

➤ Note: If you are reading Keycode from VITC it is important to that the **Check for Breaks** switch in the Label Mapping Panel should be set to **Yes**. The reason for this is explained in the *Lightworks User Guide*.

Standard Label Mapping Sets are also available for making audio-only recordings. These are:

- **AUDIO24**

  This is for making audio recordings (all channels) from an audio tape with 24 frame LTC.

- **AUDIO25**

  As for AUDIO24, but with 25 frame LTC on source tape.

Channel settings can be altered on the Recording Panel and saved with a Label Mapping Set if desired.

7.6 Checking Labels on the Lightworks System

Checks should be carried out on the Lightworks system to establish whether the labels recorded with each shot are accurate. This can be done by using the Viewer Labels Panel, which displays all the labels recorded with a shot. These should be checked for accuracy against the label burn-ins.

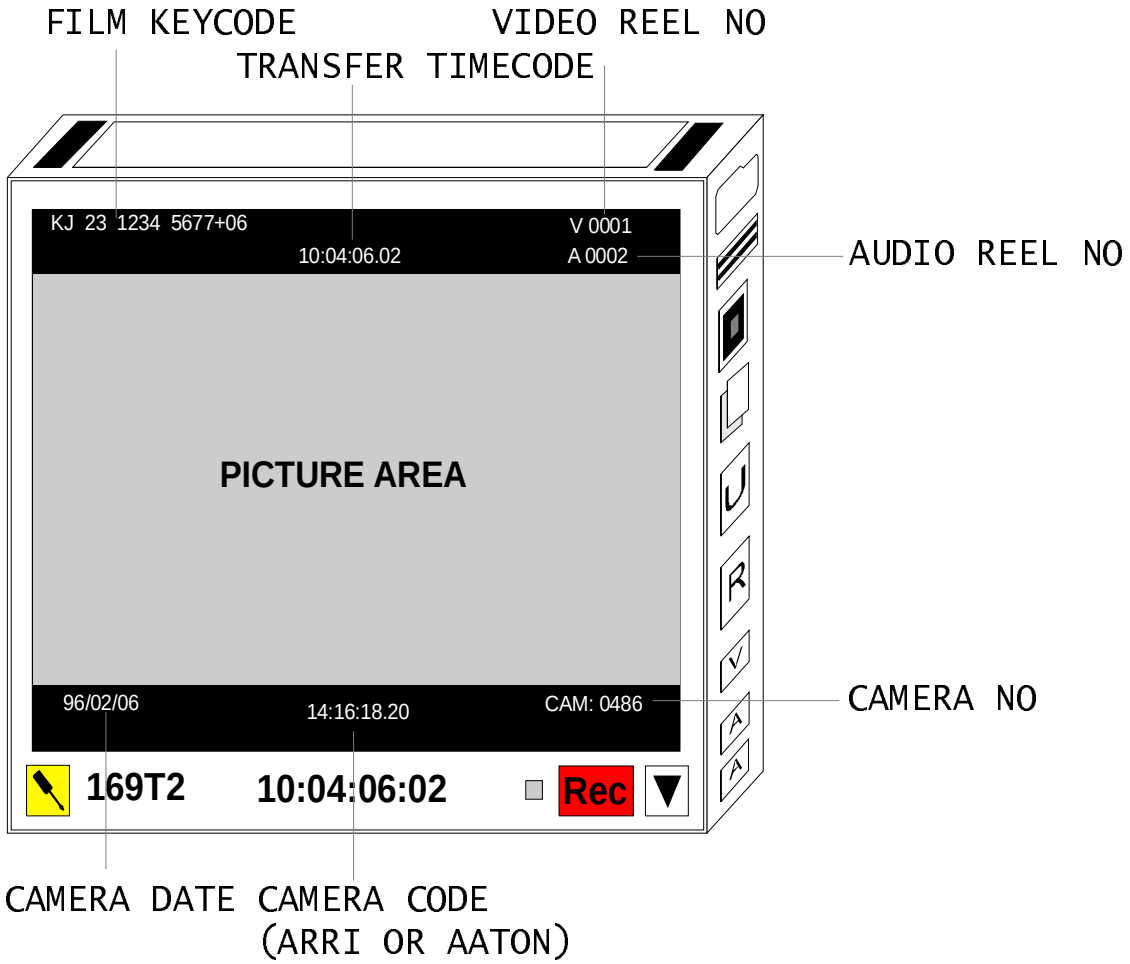
Some possible causes of inaccuracies are telecine error (e.g. incorrect labels in database or VITC), logging mistakes in the cutting room (e.g. database edited incorrectly), or in some cases, problems with the timecode output of the VTR.

Labels can be corrected on the Lightworks system using the Viewer Labels Panel. However, in cases where labels are being read from databases, care must be taken to update the relevant Logging Databases. This is critical if for any reason it becomes necessary to redigitise material.

► Note: When checking or correcting labels using the Viewer Labels Panel, it is not necessary to open the panel for each shot individually. Simply open the Viewer Labels Panel for the first shot, and then drop any subsequent shots into the same Viewer.

7.6.1 Burn-In Labels

In all cases, we recommend that transfer video timecode, keycode or rubber numbers, plus audio timecode and roll number are burnt-in to the video picture. This is an extra safety measure, to provide a cross-reference for the negative cutters or assistant editors who are conforming workprint. Because they do not normally need to be read, the codes can be unobtrusive. They should be small and dim, (preferably less than 50% IRE) and in the outer corners of the transfer. In the case of widescreen productions, they would be outside the picture area and can be masked off in the Lightworks viewers.



A Lightworks Viewer Showing Typical Burn-Ins on a 16x9 Transfer

7.6.2 Procedure for Verifying Accuracy of Burn-In Labels

It is good practice to incorporate as many physical checks into the telecine process as possible. If the label information in VITC, or in the telecine databases is not accurate then your cutlists will not be accurate! Database entries can be checked against burn-ins, but the burn-ins themselves must also be checked for accuracy. The following measures can be taken to facilitate checking:

- **Neg transfers**

  If the negative is not going to be logged by a negative cutting facility, then put a punch hole after each keycode break on a +00 frame. This can then be checked against the burn-in.

- **Print rushes rolls**

  It is common practice for assistant editors to punch first rubber number at +00 for each shot. However, if sync rushes rolls are to be transferred in one pass, it should only be necessary to punch a reference frame at the start and end of each roll.

If the burn-in at the punch hole does not fall on the expected keycode or rubber number then you should investigate the following possible causes

1. Burn-in is not accurate. Talk to your telecine house.
2. Lab or editing crew have not punched correct frame. Have the print or negative physically inspected.

7.6.3 EDLs and BITC

Assistant editors are often confused by EDLs in a PAL 24 project when encountering them for the first time because the EDLs do not appear to show what they expect to see. This is a 24 vs. 25 frame issue.

In a PAL 24 Project using straight transferred material, the picture source in and out times of the EDL will correspond to the observed timecodes for the source as they appear in the edit, and in the BITC. However, the record in and out times in the EDL will not match the record times of the edit for any given event. This is because the Lightworks system is showing edit time expressed in 24 frame terms, and the EDL is expressing time in 25 frame timecode. For example:

Lightworks		**EDL**	
Record In	Record Out	Record In	Record Out
00:00:00:00	00:00:01:13	00:00:00:00	00:00:01:12
00:00:01:13	00:00:13:15	00:00:01:12	00:00:13:02

This apparent discrepancy does not mean that there is a problem. A picture EDL will either be used for conforming rushes tapes, or as a reference for a neg. cutting facility who are using a stand-alone film database system such as Excalibur or OSC/R. In this instance, the important references are the source in and out times. These will be correct, and will match the BITC source times.

The same issue affects the Lightworks generated BITC of the edit on playout. In this case the Lightworks system displays a 24 frame timecode for the edit time. This is not useful for composers or anyone else needing to have a ‘tapetime’ timecode for audio work. The solution in this case is to playout the edit without BITC and then make a tape dub with BITC.

For a discussion of the issues affecting audio EDLs, see section A8.1 25 Frame Audio EDLs in PAL 24 Projects.

7.6.4 Technical Notes on Burn-In Labels

There are some common errors of operation in situations where databases are being created manually on the Lightworks system using burn-in information.

A common problem occurs when this process involves inputting codes from a non-DT (Dynamic Tracking) headed VTR. While the VTR is parked on a frame, the operator enters the start timecode by ‘grabbing’ the timecode using the Mark key on the Lightworks console. The keycode is subsequently added to the database manually from the burn-in window.

The problem with this method is that this can often result in 1 frame errors due to possible inaccuracies of the VTR; for example, when outputting timecode when in ‘still’ mode or when comparing burn-ins at the top and bottom of the frame (where the 'frame bar' may result in burn-ins at top-of-frame being 1 frame advanced from burn-ins at bottom-of-frame).

8.0 PAL 24 and Audio Post Production

8.1 25 Frame Audio EDLs in PAL 24 Projects

There has been some confusion among editors and post-production personnel regarding the generation of 25 frame EDLs from a 24 frame environment (e.g. a Lightworks PAL 24 Project).

All edits made in the Lightworks system occur on frame boundaries. In a PAL 24 Project the frame boundaries for both picture and sound tracks are based on the picture only. Therefore they do not correspond exactly with the frame boundaries marked on the sound by 25 frame audio timecode:

Film	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

Sound 25 frame	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

In order to overcome this problem, in a PAL24 Project the Lightworks system ignores one audio timecode label every second and resets the frame boundaries to 24 fps. This is seen in the following table, where audio timecode :12 frame label has been dropped:

Film in PAL 24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

Sound in PAL 24	1	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18	19	20	21	22	23	24	25

It must be understood that all that has happened is that the Lightworks system has altered the frame boundaries of the sound. It has not lost any of the sound nor has it changed its speed. But what has happened is that the timecode label for a particular piece of sound has altered. The following table compares the original piece of sound (labelled with 25 frame timecode) with the same sound in a Lightworks PAL 24 Project:

Sound 25 frame	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

Sound in PAL 24	1	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18	19	20	21	22	23	24	25

There is only one place where the frame boundaries align between the two pieces of sound in the diagram above (at frame :01). If a sound cut is made in the Lightworks at timecode :11, for example, it can be seen that this does not correspond to a frame boundary on the sound as it is was originally labelled.

Therefore when the Lightworks system comes to create an EDL for the audio it will always be slightly inconsistent. The Lightworks system has to make its best guess as to which 'real world' frame boundary to use. This can be heard by comparing sound played out from the Lightworks system with the conformed sound made from the EDL. What will be heard are occasional phase errors. In most cases these will be one frame, occasionally 2 frames.

8.2 Making Playout Video Tapes for Audio Post Production

To make a controlled video tape copy of a Lightworks edit, where accuracy is critical (e.g. for audio post-production), the Lightworks Playout Viewer should be used. It is important to consider the technical specifications for the video tape, which should be discussed with the facility that requested the playout. Factors such as running speed, letterboxing and requirements for burn-ins should be considered.24 fps Pulldown Playout

8.2.1 24 fps Pulldown Playout

In a PAL24 Project, editing takes place at 24 frames per second. When playing a shot or edit, the Lightworks system automatically inserts one duplicate video field every twelve frames, to ensure correct synchronisation and running time.

In Lightworks Version 6 software, the Playout Viewer will playout an edit from a PAL24 Project at film rate (24 fps), repeating one video field every twelve frames. Note that the duplicate fields can cause a slight judder effect on playback.

The Lightworks Playout Viewer can be set to playout an edit from a PAL 24 Project at film rate, i.e. where running time is identical to that of film projected at 24 fps.

To achieve this the Lightworks system uses a pulldown scheme similar to that used in telecine. This ensures real time run length by inserting one duplicate field into the video stream every 12 frames. This form of playout can be used for any requirement that demands correct running time e.g. audio post-production.

8.2.2 25 fps Fast Playout (Version 4 Software Only)

In Lightworks Version 4 / Heavyworks Version 2 software, the Lightworks Playout Viewer can be set to playout an edit from a PAL24 Project at video rate (25 fps), by setting the Playout Menu command Play PAL Film Fast to YES. The edit will be played out frame-for-frame at 25 fps, with the sound speeded up to maintain synchronisation.

A fast playout can be used to provide a video tape copy for:

- **Negative cutting**

  The negative cutters can compare the negative frame-for-frame with the video tape.

- **Making video copies of sync rushes**

  Where syncing took place after telecine and there is a requirement to lay the sync audio on to the mute rushes tapes.

- **Video conform of fast rushes**

  Where an offline guide of the edited video and/or audio is required.

➤ Note: The fast playout feature is not available in Version 6 software (even though the Playout Menu command Play PAL Film Fast may be present). Edits created in Version 6 can be played out in Lightworks Version 4 / Heavyworks Version 2 software – however do not do any further digitising or editing in these versions.

8.3 Transferring Pro-Sound Tracks to a Digital Audio Workstation

The following methods are available for transferring Pro-Sound audio tracks to Digital Audio Workstations:

- **Export Lightworks sound material files**

  The Lightworks sound files (referred to as .S24 files) can be exported to a compatible Digital Audio Workstation via magneto-optical disk (e.g. DAR or AMS systems which are able to read Lightworks format sound files).

- **Convert Lightworks sound files to OMFI2 or WAV format**

  Use the Lightworks OMFI2 and WAV file conversion feature prior to exporting sound files to a Digital Audio Workstation. *(For more information about the OMFI2 and WAV conversion feature, see the Lightworks User Guide).*

- **Playout Lightworks audio tracks onto DAT or other digital tape format**

9.0 Post-Production Routes for Feature Films

This section outlines some of the most commonly used and successful post-production routes for feature films in the PAL world, with their particular advantages and disadvantages.

There are many permutations of these routes, too numerous to be described here. It is assumed that a production can adapt a route to its individual requirements based on the information contained in this document.

9.1 Route 1 - Print/Mag (Straight Transfer)

This is the route favoured by feature films in the PAL world where print and mag are available for all selected rushes takes.

1 Shoot film at 24 fps and record sound with 25 frame timecode to Nagra or DAT. *(See section 2.3 Audio Timecode Standard).*

2 Strike positive rush print and transfer sound rushes to mag at native rate. Audio timecode should be transferred to mag.

3 Sync up rushes on film synchroniser.

4 Screen rushes and check sync.

5 Rubber number each rushes roll.

The US numbering system, where each dailies roll has a continuous run of ascending Acmade numbers, would be our normal recommendation. For example, roll number one might start at 001_____1000+00. Second Unit or Visual Effects Unit rolls can be identified by adding a letter to the prefix e.g. 001A.

Wild sound should be handled as for sync sound, i.e. rubber numbered and sent to telecine for transfer to the audio channels of a video tape.

► Note: Some productions have used a slate by slate numbering system in conjunction with this route. However, this requires intensive and time-consuming work to be done on databases before rushes can be recorded into the Lightworks system.

6 Send sync rushes rolls to telecine house

Straight transfer to video tape at 25fps.

The start for the burn-in of rubber numbers is manually set by the telecine house at the head of each roll.

Audio timecode will be read from the mag during telecine. The 25 fps transfer will effectively result in ‘fast’ timecode being played through the sound follower i.e. 26 counts in one second for 25 frame timecode. This is not a problem for the Lightworks system if there is an accurate database entry noting the correlation between the start video transfer timecode and the audio timecode. However, it is not possible for fast 25 frame timecode to be recorded into the Lightworks system using VITC.

Audio timecode should also be burnt into the picture.

Keycodes can be inserted into VITC if required. These can be read into the Lightworks system as the rushes are recorded. This is useful for productions with large numbers of visual effects shots or opticals.

7 Create a Logging Database.

The telecine database will specify the start and end video tape timecodes for each shot, plus start labels for rubber numbers and audio timecode if appropriate. Some database formats support concurrent rubber number and keycode fields. Check with the telecine facility to see if this is available.

Convert the database to a Lightworks Logging Database. The Lightworks assistant should enter additional information (e.g. slate/take, scene number, sound roll, cam roll, notes) before the rushes are recorded into the Lightworks system.

8 Record rushes video tape into a PAL 24 Project using the Logging Database.

Recording Parameters must be set up for recording from a straight telecine transfer.

9 Edit in a PAL 24 Project.

10 Generate a film cutlist from Lightworks edit using the Cutlist Tool.

This will generate:

- **A pull-list (list of takes to pull out of synced rushes rolls)**
- **A cutting list (known as the 'assembly' list)**
- **An opticals list**

In cases where keycodes cannot be tracked automatically, rubber numbers must be correlated to keycodes by physically examining the workprint before ordering opticals.

11 Order opticals if necessary. When prints of the opticals arrive, rubber number them and have them telecined as for normal rushes rolls. Cut on the Lightworks system and then output pull-list and assembly list. Pull shots from opticals rolls and conform to new assembly list.

or

Cut in opticals to workprint directly. If cutting is to continue on the Lightworks system, then your electronic edit will have to be modified to match the workprint. This will involve reconstituting opticals rolls and sending them to telecine if this has not already been done.

12 Conform cutting copy.

13 Generate audio EDL.

14 Make playout video tapes for reference during audio post-production.

These will be pulldown playouts of 24 fps edits to video tape with 25 frame timecode. This will provide real time run-length picture reference.

15 Conform sound on digital audio workstation using original 1/4 inch tapes or DATs.

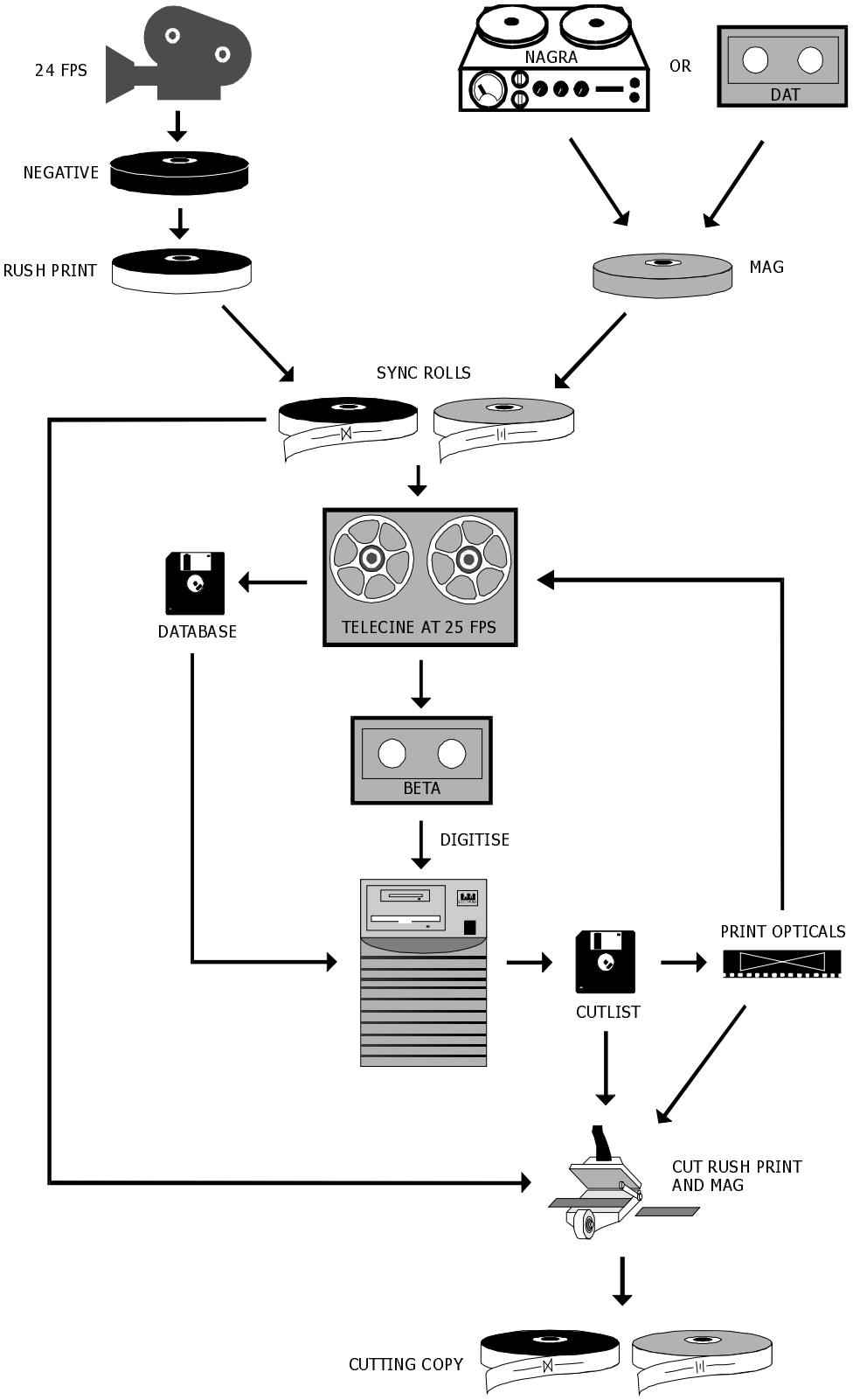
16 If changes are to be made to the cut, make the changes on the Lightworks system, and then generate a Changelist report using the Lightworks Changelist program (a separate utility which provides a highly efficient way of implementing changes on a cutting copy).

17 Conform changes to cutting copy.

18 Generate new audio EDLs for sound editors.

19 Make new playout video tapes for sound editors.

20 When final cut approved, send cutting copy to neg. cutters.



Route 1 - Print/Mag (Straight Transfer)

9.1.1 Advantages of Route 1

- Sync-up uses conventional methods, so rushes can be projected.
- Telecine process is straightforward as rushes are already synchronised.
- Film label handling relatively simple.
- Cutting copy available for projection.
- Audio for temp dubs can be played out directly from the Lightworks system.

9.1.2 Disadvantages of Route 1

- A more costly procedure than making direct transfers from negative.
- Requires traditional film cutting facilities as well as a Lightworks cutting room.
- Video tape rushes run 4% fast.

9.1.3 General Notes on Route 1

- It is strongly advised that an experienced Lightworks assistant is employed to manage projects of this kind.
- This route can also be employed using PAL pulldown transfers.

9.2 Route 2 - Straight Transfer Negative, Sync-Up in Lightworks

In this example, film labels are tracked by the neg. cutting facility using a stand-alone film database system such as OSC/R or Excalibur. All negative and print handling and cutting can be carried out by this facility.

1 Film shot at 24fps.

2 Audio recorded on Nagra with 25 frame timecode.

(See section 2.3 Audio Timecode Standard).

3 Negative transferred mute to video tape at 25 fps.

Database created listing start and end video timecodes only.

4 Audio 1/4 inch transferred to DAT.

Location timecode transferred if required, or new continuous timecode could be generated (this is preferable for the audio conforming process).

➤ Note: This route does not, strictly speaking, use the copy DAT principle, since the audio timecode is not identical to that of the corresponding pictures on the mute video tape. DATs are made because it's more convenient to record audio into the Lightworks system from a DAT machine using 9-pin serial control than from a Nagra.

5 Negative sent to neg. cutting facility for logging. video tape timecodes at start and end punches are noted as reference for later EDL conversion process.

6 Record picture rushes into PAL 24 project on the Lightworks system.

The Recording Parameters should be set up for straight transfers. (*See section 6.1 Recording Rushes into a PAL 24 Project).*

7 The Lightworks system performs 24/25 speed correction.

8 Record sound rushes from DAT.

9 Sync up in the Lightworks system using slate boards for reference.

The syncing up process results in the creation of 'Sync Ghosts', which are used as source tiles during editing. *(See the Lightworks User Guide for an explanation of the term Sync Ghost).*

10 Edit in a PAL 24 Project

11 Generate video EDL on the Lightworks system.

This EDL is sent to the negative handling facility and converted to a neg. cutting list.

12 Generate audio EDL on the Lightworks system

13 Conform audio from rushes DATs on Digital Audio Workstation.

14 Make Lightworks playout video tapes for reference during audio post-production.

These would be 'film rate' or 'pulldown' playouts, with 1 repeat field every 12 frames, to ensure real-time duration.

15 Make Lightworks playout video tapes for neg. cutters.

These would be straight playouts where there is one film frame to every frame of video.

or, alternatively

16 Autoconform rushes video tapes.

This would be a ‘quick conform’ from the rushes video tapes using a Lightworks video EDL. It provides a quality copy for viewings and neg. cutter reference, and is purely an optional procedure. This conform will obviously be 'fast' i.e. 25/24 - 4% fast and therefore not suitable for audio work.

An audio guide track for the video tape conform can be created by doing a Lightworks playout at 25/24.

17 First print struck for projection.

Produce an over-length neg. cut, followed by an over-length cut workprint, which can then be assembled for the first viewing copy.

18 Make any subsequent changes to the edit on the Lightworks system.

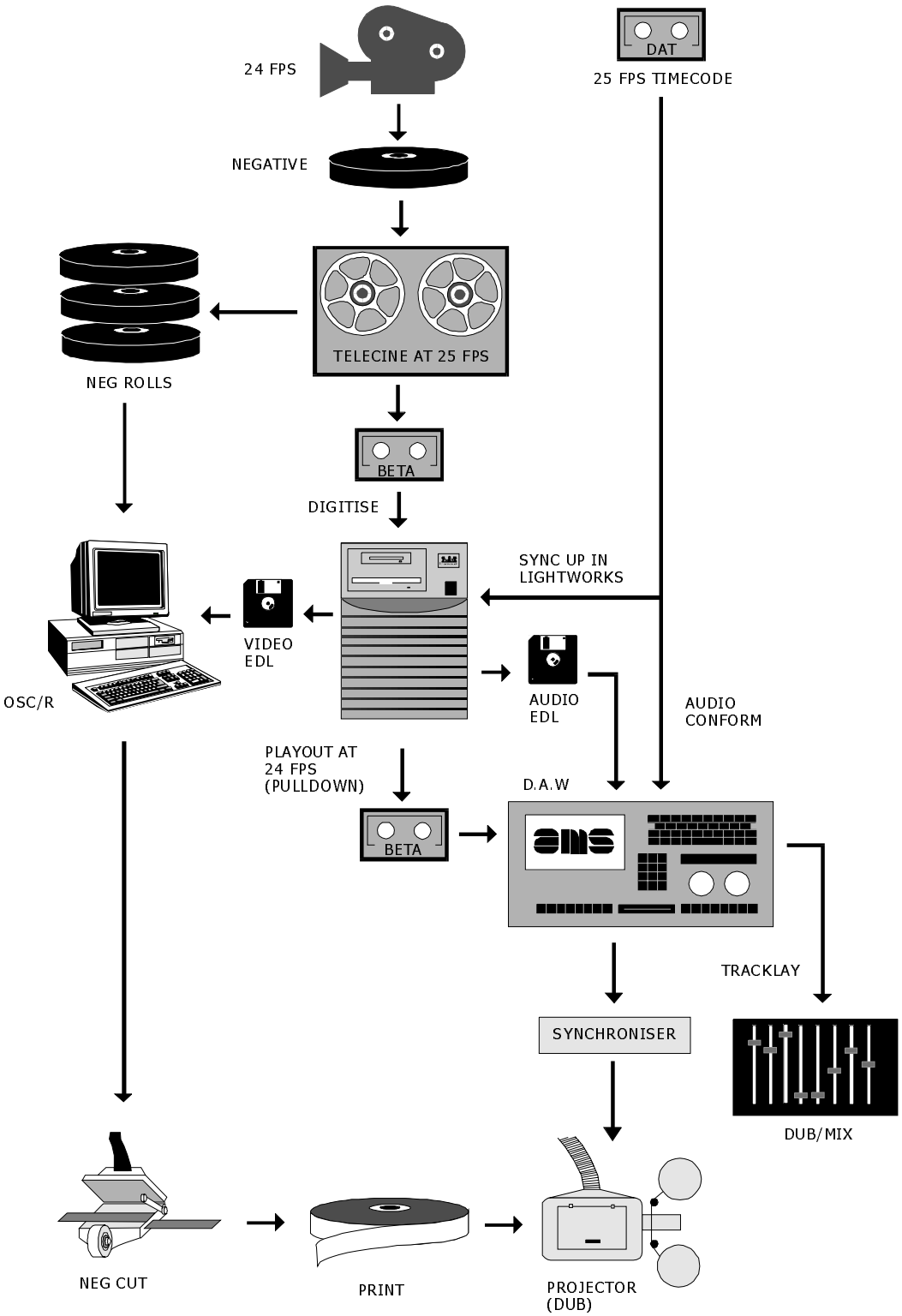
Send new EDL to neg. cutting facility, who conform changes to print.

19 Audio tracklay on Digital Audio Workstation.

20 Audio mixing.

This is carried out using a 24fps print projection as the picture source. The projector is synchronised to a Digital Audio Workstation.

► Note: If this route is taken, it must be ensured that the audio mixing theatre can synchronise 24fps bi-phase (projector) with 25fps timecode (Digital Audio Workstation).



Route 2 - Straight Transfer Negative, Sync-Up in Lightworks

9.2.1 Advantages of Route 2

- Telecine costs minimised: straight mute transfer.
- Film timecode systems not required on set.
- Negative and print cutting managed by one facility.
- Video and audio EDLs are the only list requirement from Lightworks cutting room. This is less time consuming for the Lightworks assistant.
- Simple route in concept.

9.2.2 Disadvantages of Route 2

- Sync rushes are not available on transfer tapes: the first time you see sync rushes will be on the Lightworks. Playout tapes can be made from the Lightworks but this means more assistant time is required on the system.
- Time required for recording rushes into the Lightworks system is doubled because video and audio are handled separately.
- Extra assistant time is required at the Lightworks system for syncing up.
- There is no print available for projected viewing of rushes.
- Video tape rushes run 4% fast.

➤ Note: On one feature that used this route the DoP had 4 or 5 slates per day printed. This provided a reference for the remaining rushes which were viewed on video tape.

9.2.3 General Notes on Route 2

- The relationship between the DoP and the telecine operator is very important, replacing the traditional relationship with the print grader.
- Syncing up in this case is done manually by the Lightworks assistant working from slate boards. Lightworks auto-sync capability relies on there being matching time-code between picture and sound rushes. This is usually achieved with the use of film timecode. However, 24 frame timecode is not suitable for productions wishing to conform audio from an EDL. The Lightworks Pro-Sound option must be used instead. *See section 2.3 Audio Timecode Standard*.
- It should be noted that it is not a requirement of this route that a neg. cutting facility be used to perform database and cutting list management. Cutting lists can be generated from the Lightworks system if provision is made for tracking the relevant film labels.

9.3 Route 3 - Straight Transfer Negative with Audio Speed-Up

1 Shoot film at 24fps.

2 Shoot audio on Nagra or DAT with 25 frame timecode.

3 Telecine negative at 25fps.

Film labels can be put into either VITC or a database.

4 Sync sound rushes to picture with 4% speed-up. The following options are available:

- **Automated sync-up during telecine transfer** *(See section 4.3 Sync-up in Telecine)*
- **Sync up after telecine. Sound is added to mute video tape in sync suite** *(See section 4.4 Sync-up After Telecine in an Electronic Sync Suite)*

5 Produce a database including original audio timecode.

If the Lightworks system knows the original audio timecode then an audio EDL can be produced. This information will be imported with each shot via a database, which can be generated at any of the following stages:

- **At the telecine**
- **In an electronic sync suite**
- **On the Lightworks system or separate PC, if timecoded slate boards have been utilised at the shoot**

➤ Note that there is no audio timecode burn-in as the telecine transfer is mute.

6 Record sync rushes into Lightworks PAL 24 Project.

The Recording Parameters should be set for recording from straight transfers. *(See section 6.1)*.

7 The Lightworks system automatically speed corrects the material to enable 24 fps editing.

8 Edit in a PAL 24 Project.

9 Generate picture cutting lists on the Lightworks system.

10 Generate an audio EDL for sound editors.

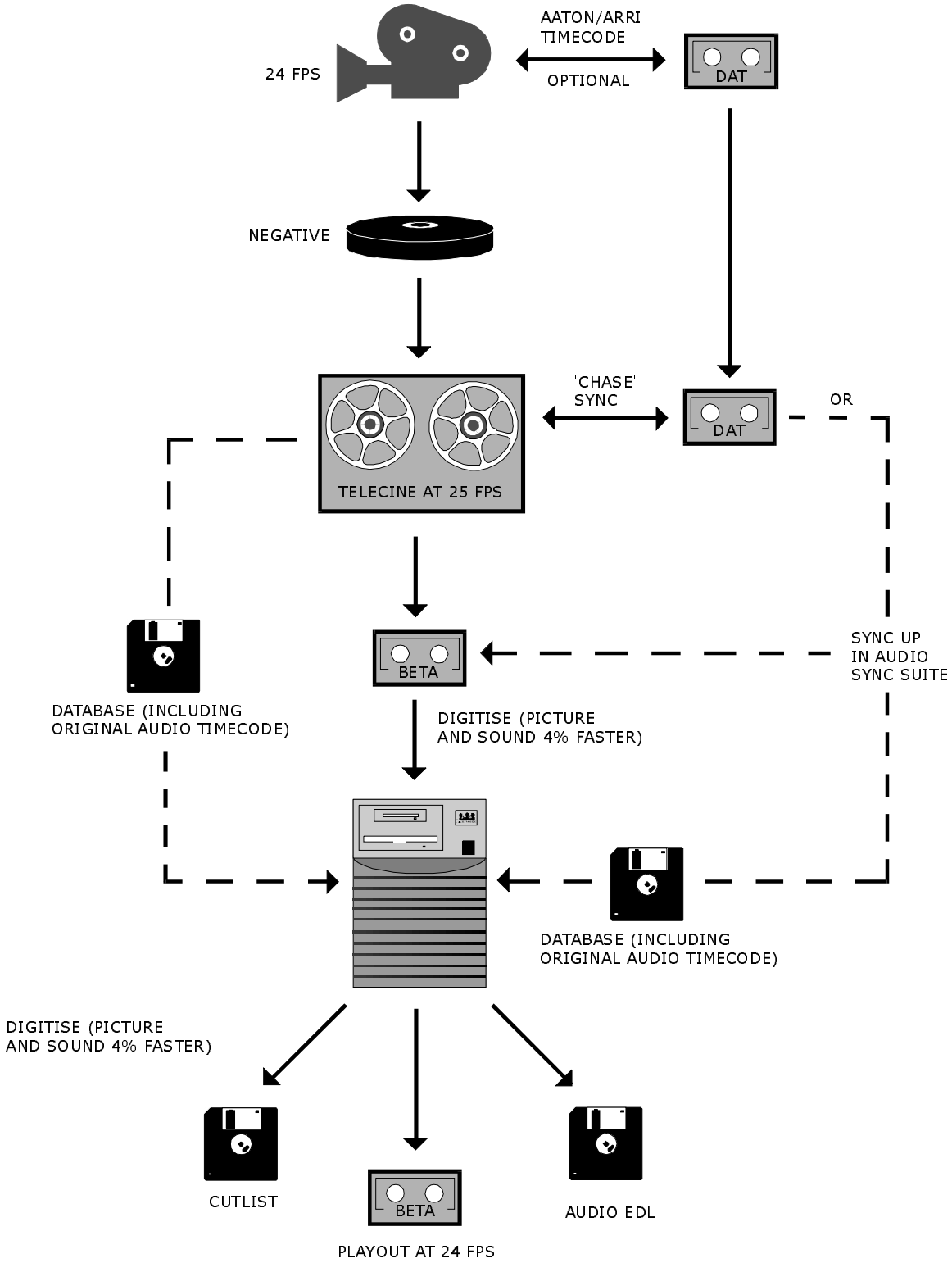
This will be in with reference to the original field timecodes for an autoconform into a Digital Audio Workstation.

11 Make a Lightworks playout video tape for reference during audio post-production.

This will be a pulldown playout of 24 fps material to video tape with 25 frame time-code. This will provide real time run-length picture reference.

12 Audio mixing.

To either a projected print or Lightworks playout on video tape.



Route 3 - Straight Transfer Negative with Audio Speed-Up

9.3.1 Advantages of Route 3

- Sync rushes available on video tape.
- Recording into the Lightworks system can be done in one pass - i.e. not syncing in the Lightworks system.

9.3.2 Disadvantages of Route 3

- Highly dependent on the technical facilities available with regard to the audio speed-up and process of getting audio timecodes into a database.
- Video tape rushes will be 4% fast.

9.3.3 General Notes on Route 3

With regard to the arrangements for audio post-production, another option is to utilise Pro-Sound within the Lightworks system - thus avoiding the difficulties of tracking labels for an audio conform. *See section 8.3 Transferring Pro-Sound Tracks to a Digital Audio Workstation*.

9.4 Route 4 - Transfer Negative using PAL Pulldown and 3-Line VITC

This route makes use of the 3-Line VITC standard in conjunction with the auto-sequence detection capability of the Lightworks system. This allows automatic detection of the PAL pulldown sequence from the source video tape.

See section 3.1.2 for a diagram of the PAL Pulldown scheme.

1 Shoot at 24 fps.

2 Audio recorded on Nagra or DAT.

Use 24 or 25 fps audio timecode. *(See section 2.3 Audio Timecode Standard)*

3 Telecine negative mute at 24 fps with PAL pulldown.

Keycode inserted into VITC during transfer.

4 Sync-up audio in electronic sync suite.

Syncing up takes place with audio at native rate as picture has been transferred at 24 fps: there is no speed change for picture or audio.

A copy DAT can be produced which will contain native rate audio and continuous 25 frame timecode matching the rushes video tape. (*See section 4.7 Copy DATs).* If original audio timecodes are to be retained, check that the syncing facility have an effective method for recording them in a database.

5 Record rushes into Lightworks PAL 24 Project.

Recording Parameters should be set up for pulldown transfers. *(See section 6.1 Recording rushes into a PAL 24 Project).*

► Note: The Label Mapping Set for the relevant Project should have the **Check Breaks?** switch for keycode set to the **Yes** position. This is essential for correct recording of film labels. *(See the Lightworks User Guide for more information about label mapping)*.

6 Edit in the Lightworks system at 24 fps.

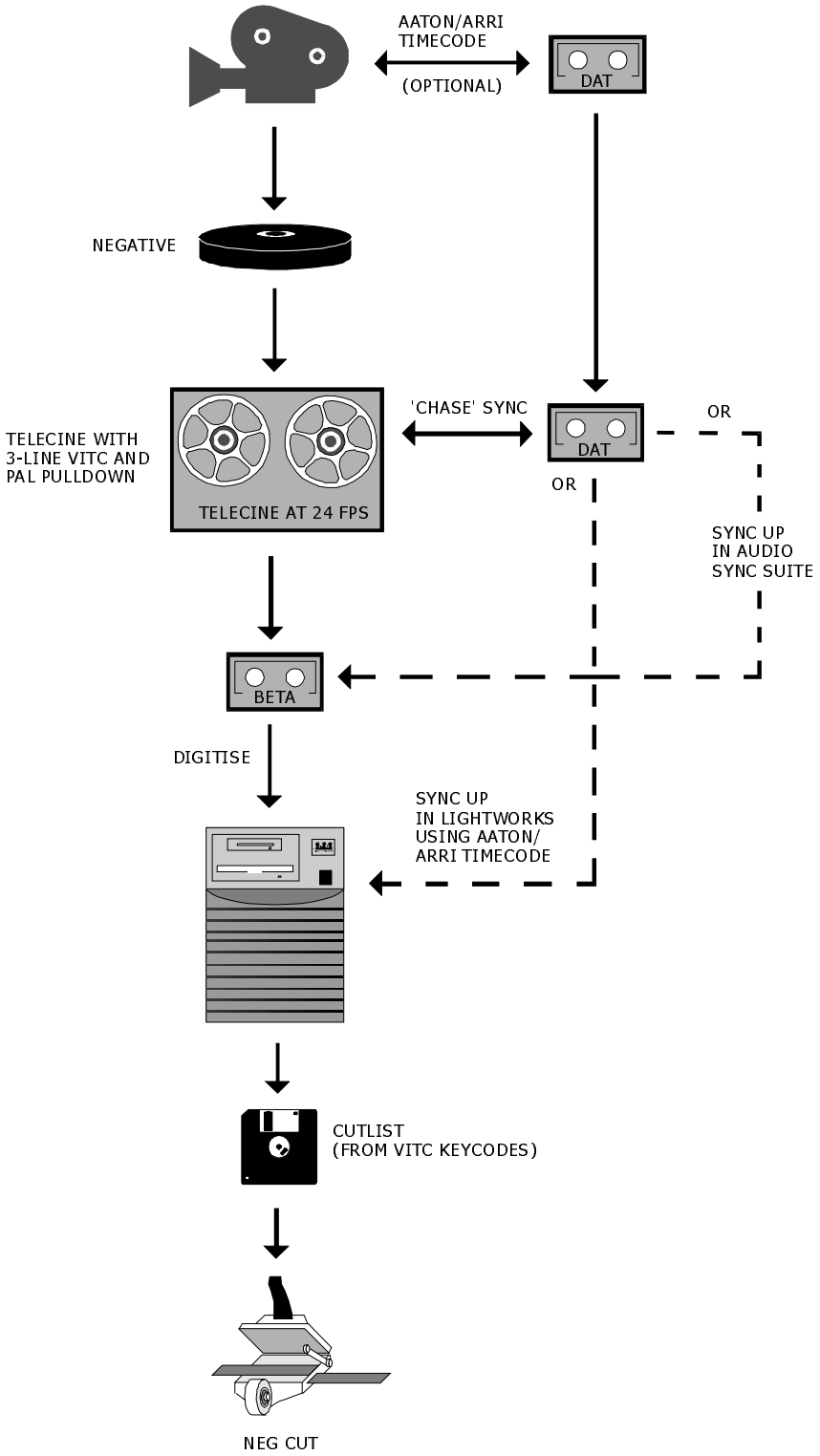
7 Output film cutlist from the Lightworks system.

All normal film reports generated; Pull List, Assembly List, Opticals List and Reprint List, as well as the necessary reports for Changelists.

8 Send cutlist to neg. cutting facility.

9 If 25 frame audio timecode has been used, output audio EDL from the Lightworks system. This can be with reference to the rushes video tape timecodes, and therefore the copy DATs, or with reference to any original audio code that might have been tracked through the Lightworks system.

Alternatively, use the Pro-Sound option and transfer audio tracks directly to a Digital Audio Workstation. This would be the preferred method if 24 frame audio timecode has been used. *See section 8.3 Transferring Pro-Sound tracks to a Digital Audio Workstation.*



Route 4: Transfer Negative using PAL Pulldown and 3-Line VITC

9.4.1 Advantages of Route 4

- Picture and sound always remain at native rate.
- Audio sync is easily achieved.
- Telecine transfer does not have to be 'one pass per roll' allowing selective grading of rushes.

9.4.2 Disadvantages of Route 4

- Relies heavily on telecine setup. Correct phasing of picture sequence with label reading equipment (e.g. Aaton, Evertz kit) must be ensured.

9.4.3 General Notes on Route 4

The PAL pulldown method is equally applicable to a print/mag route, which makes it highly analogous with the routes used by U.S. feature film productions. The details of these routes are covered in other Lightworks film documentation, specifically written for film production in the NTSC world. These documents can be found on the Internet at *http://www.tek.com.*

10.0 Lightworks Logging Database Format

Logging information about shots can be imported into the system and used to control the recording process. This appendix describes the standard Lightworks Logging Database format, which has been designed to allow flexible input from a variety of sources.

A working knowledge of database files will be required to understand this section.

10.1 Basic OLEDB Format

The Lightworks Logging Database format was designed to be fairly flexible in its demands. In essence OLEDB is a comma-delimited ASCII format database (CDF). The database is in three parts:

- **A header describing the layout of the entries**
- **Parameters describing the recording**
- **Individual entries**

The entire database is in plain ASCII text, one line per parameter, header or entry. All lines and fields within entries are normally in double-quotes, “thus”.

The Lightworks Logging Database is sometimes referred to as an OLEDB or ODB database.

10.1.1 Database Header

The header describes the layout of the database. It may take either of two forms. The preferred form is described in this section. *(See section 10.1.3 for a description of the Alternate Form of Header).*

The preferred form consists of 4 lines, describing this as a standard Lightworks database.

- **The first line simply states this fact**

  “OLEDB”

- **The second line describes the maximum number of characters allowed in each field (the field widths) and is a CDF entry**

  In the case of timecode fields, the number (12) is strictly speaking redundant, since they are fixed: however, it should still be present.The minimum database would be:

  “20”,”3”,”12”,”12”,”120”

  For a FILMDB containing all the fields, this would be:

  "24","8","12","12","4","9","4","4","8","15","4","4","12","4","12","15","8", "12","4","8", "8", "24","24","24","64","100"

- **The third line describes the types of the fields**

  There are only two types: TEXT, and TIMECODE. Keycodes/ink codes are "text". The line is a CDF entry:

  “TEXT”,”TEXT”,”TIMECODE”,”TIMECODE”,”TEXT”

  For a FILMDB containing all the fields, this would be:

  "text","text","timecode","time-
  code","text","text","text","text","text","text","text","time-
  code","text",
  "timecode","text","text","time-
  code","text","text","text","text","text","text","text","text"

- **The fourth line uses field names to describe the layout of the fields in the entries.**

  It too is a CDF entry. The fields are identified to Lightworks programs by their names, so the names must always be exactly correct. The order of the fields is ignored within Lightworks programs, and in any given application many of the fields may be optional. However, any fields that do exist, but do not have one of these labels, are ignored.

  “Name”,”Reel”,”Start time”,”End time”,”Description”

10.1.2 Parameter Header

A database may also have an optional parameter header, which can contain information such as dates and name, but is mainly used for setting default values for the other database fields. When default values are provided, there is no need to fill in the matching fields in each entry, (or even to have those fields). The parameters are optional, but if present, they come first in the database. They consist of a series of name:value pairs, one per line.

If there are any parameters, the first one should be the identifier:

“OLEDB:Rev 1”

followed by the entries, for example:

“Film rate:24”

“pulldown:1”

The entries may be in any order, and any or all may be omitted. Spaces and case are ignored. However, the names that are used must be exactly correct.

There is no absolute need for a parameter section at all, as if any parameter lines are left out, default assumptions will be made when the database is imported, according to the configuration of the system.

10.1.3 Alternate Form of Header

The alternate form of header is simply the line containing the field labels. The OLEDB marker, field-type and field-size lines are left out. This format is the one normally produced by an external database which is exporting to CDF.

In this case, when the database is imported into the system, assumptions will be made about the field types and their maximum sizes.

The field types are derived from the labels: they will all be assumed to be TEXT unless the label is one of the standard ones defining a time - such as “start time”.

The maximum size of the field will be defaulted to the standard values. This will not normally have any serious effect, unless you are working with very long fields.

10.2 Format of the Main Log

The individual entries are in comma-delimited ASCII format (CDF), and each contain all the information as described in the header, in the same order.

For example:

"Stuff","B32","01:02:13:54","01:05:27:03","Not very good"

Any or all of the fields may be empty; but in this case the quotes and comma must still appear. If a field that provides a control is empty (such as channels to record), it will default to the header parameter, or if there is not one present in the header, to the Recording Panel or Project settings.

10.3 Default Values

Lightworks programs that use Logging Databases work out their values in each record on this basis:

- If the field is compulsory, it must have a value: if none is present, there is an error.
- If the field is optional, but exists and has a value, that value is used
- If a field is optional and defines a standard, if it is missing or empty, the default parameter value will be used.
- If there is no field and value, the default parameter is used from the header.
- If there is no default parameter set, the system uses the settings on the interface Recording Panel, or defaults to fixed values, such as timecode-type based on the current Project.

10.4 Fields Required

The minimum database requires only the following fields:

- **Reel ID**
- **Start time**
- **End time**

This will allow correct recording of shots. However, no names will be entered into the Filecards for the shots. Therefore, it is advisable to include a field containing shot names. This field may be labelled either "Name" or "Slate/take". Either version will be entered into the Filecard.

Some other fields that can be used:

- **Any of the fields on the Filecard: Scene, Who, Shot, Description, Notes**
- **Channels: Controls which channels to record, for each entry**
- **Picture quality**

The above list completes the basic database. Additional fields are produced in Lightworks film databases.

10.4.1 Complete List of Field Names and Widths

This is a list of the field names followed by their widths.

- **"name"**

  Shot name. 24 characters.

- **"reel"**

  Video (telecine) reel ID (alphanumeric). 8 characters.

- **"start time"**

  Video in timecode for the shot.

- **"end time"**

  Video out timecode for the shot.

- **"sequence"**

  Pulldown sequence. 4 Characters. *(See section 10.5.7).*

- **"chans"**

  Any combination of V and A1, A2, A3, A4. 9 characters.

- **"pic qual"**

  Quality in minutes per GB. 4 characters.

- **"label_std"**

  Video timecode type (NB: not same name as default). Used to override the compulsory default parameters. 4 characters.

- **"cam reel"**

  Film camera reel. 8 characters.

- **"start keycode"**

  Prefix, count + offset complete. 15 characters. *(See section 10.5.6).*

- **"start perf"**

  For 3-perf 35mm only: describes where (which foot) in the cycle the Keycode lies. 4 characters. (*See section 10.5.8).*

- **"film label_std"**

  Film type.Used to override the compulsory default parameters. 4 characters.

- **"start camcode"**

  Camera code (Aaton/Arri) if any.

- **"cam label_std"**

  Camera-code type. 4 characters.

- **"cam date"**

  Camera date (string). 12 characters.

- **"start inkcode"**

  Also known as Acmade-code or rubber-numbers. 15 characters.

- **"snd reel"**

  Sound Reel number, start code and type (if any). 8 characters.

- **"snd start"**

  The audio in-timecode for the shot

- **"snd label_std"**

  Audio timecode type. 4 characters.

- **"lab reel"**

  Lab reel-number. 8 characters.

- **"comp reel”**

  Composite reel-number. 8 characters.

- **"scene"**

  Text string. 24 characters.

- **"shot"**

  Text string. 24 characters.

- **"who"**

  Text string. 24 characters.

- **"description"**

  Text string. 64 characters.

- **"notes"**

  Text string. 100 characters.

10.5 Lightworks Film Databases

The Lightworks Film Database (sometimes referred to as FILMDB) is the most elaborate of the databases Lightworks systems use, and contains the most variants and parameters. However, there is no absolute need to include unnecessary fields (such as 3-perf. alignment when not using 3-perf. film).

10.5.1 FILMDB Header

This describes the settings for parameters that a FILMDB might contain.

"OLEDB:Rev 1"	Revision number for OLEDB.
"FILMDB:Rev 9"	Revision number for FILMDB.
"video label_std:N"	Standard of telecine timecode
"film label_std:F16"	Film gauge
"chans:VA1"	Which channels to record (any combination of V and A1-A4)
"pic qual:40"	Quality in minutes per Gigabyte
"snd label_std:N"	Standard of sound timecode
"cam label_std:P24"	Standard of in-camera timecode
"film rate:24.0"	The speed the film was shot
"pulldown:1"	Whether pulldown was used in transfer No=0 or Yes=1 only.
"sequence:0"	If pulldown, standard sequence number
"OLEDB"	

10.5.2 Default Parameters for Film Databases

In general, if a field that is optional and defines a standard is missing or empty, the default parameter value will be used.

- "video label_std" and "film label_std" must be present.
- "snd label_std" defaults to same as video.
- "cam label_std" defaults to 25-frame code if video_label_std is PAL, 24-frame if NTSC.
- "chans", "pulldown", "sequence","pic qual". These default to what is set on the Recording Panel.

10.5.3 Audio Only Entries

If a record in a FILMDB describes an audio only recording, the audio timecode start and finish should be placed in the "start time" and "end time" fields (and if the code-type is not the same as "video label_std" in the header, it should be placed in the "label_std" field). This should be done as well as filling in the normal "snd start" and "snd label_std" fields. This is because the program uses the basic fields to control the recording (VTR cueing and times) and expectations about timecode type.

10.5.4 Label Formats

All timecodes, keycodes, ink-numbers and any other form of identifiers used on a piece of material are generically termed “labels”. This term has been chosen because it is descriptive and because it does not have any connotations of time. Codes on material usually have nothing to do with time, and assuming they do can cause confusion.

10.5.5 Timecode Format

Timecode fields are in a rigid format. Allowable variations are:

- The leading zero on hours may be missing.
- In PAL, the separator between seconds and frames may be a colon or a full stop. This has no particular significance.
- In NTSC, the separator may be a colon, a full-stop, a semi-colon or a comma. Semi-colon and comma are used to signify drop-frame timecode.

10.5.6 Label Standard Fields

The "xxx label_std" fields are used to hold a combination of information about timecode/video/film. Values are:

- **P** PAL
- **P24** 24-frame timecode
- **N** NTSC
- **ND** NTSC drop-frame
- **F16** 16mm film
- **F35** 35mm film
- **F353** 35mm film used at 3 perfs-frame.

➤ Note: The variant-values N24 and ND24 have appeared in earlier versions of the OLEDB format. These types of entry are still allowed but will be treated as N and ND.

- **Timecodes**

  All timecodes are in standard format HH:MM:SS:FF. NTSC drop-frame codes can be entered as HH:MM:SS;FF - this will override any other default. Allowable variation: HH:MM:SS.FF and HH:MM:SS,FF respectively.

■ **Keycodes and Inkcodes**

All keycodes and Inkcodes are expected to be a full code with prefix, count and offset in this format: KJ2905491234+02. An acceptable substitute when codes are not complete is to pad them with underscores: XX_____1234+02; however, the full 15 characters must be present. Note this difference between key and inkcodes:

16mm - keycode every 20 frames

16mm - inkcode every 40 frames

35mm - keycode and inkcode every 16 frames

Lightworks programs that generate FILMDBs guarantee that all codes are produced in these formats, so that programs using them do not have to attempt to fill in the gaps.

10.5.7 Pulldown Sequence

The standard for describing pulldown sequence is based on which frame appears at midnight (00:00:00:00).

■ **For PAL Pulldown transfers, this means:**

Sequence 0	A1A2 frame at 00:00:00:00
Sequence 1	B1B2 frame at 00:00:00:00
Sequence 2	C1C2 frame at 00:00:00:00
Sequence 3	D1D2 frame at 00:00:00:00
Sequence 4	E1E2 frame at 00:00:00:00
Sequence 5	F1F2 frame at 00:00:00:00
Sequence 6	G1G2 frame at 00:00:00:00
Sequence 7	H1H2 frame at 00:00:00:00
Sequence 8	I1I2 frame at 00:00:00:00
Sequence 9	J1J2 frame at 00:00:00:00
Sequence 10	K1K2 frame at 00:00:00:00
Sequence 11	L1L2 frame at 00:00:00:00
Sequence 12	L3M1 frame at 00:00:00:00
Sequence 13	M2N1 frame at 00:00:00:00
Sequence 14	N2O1 frame at 00:00:00:00
Sequence 15	O2P1 frame at 00:00:00:00
Sequence 16	P2Q1 frame at 00:00:00:00
Sequence 17	Q2R1 frame at 00:00:00:00
Sequence 18	R2S1 frame at 00:00:00:00
Sequence 19	S2T1 frame at 00:00:00:00
Sequence 20	T2U1 frame at 00:00:00:00
Sequence 21	U2V1 frame at 00:00:00:00
Sequence 22	V2W1 frame at 00:00:00:00
Sequence 23	W2X1 frame at 00:00:00:00
Sequence 24	X2X3 frame at 00:00:00:00

■ **For NTSC 2:3 Pulldown transfers, this means:**

Sequence 0	A1A2 frame at 00:00:00:00
Sequence 1	B1B2 frame at 00:00:00:00
Sequence 2	B3C1 frame at 00:00:00:00
Sequence 3	C2D1 frame at 00:00:00:00
Sequence 4	D2D3 frame at 00:00:00:00

10.5.8 35mm 3-Perf

Since keycodes on 35mm occur every 64 perfs, 3-perf frames only line up accurately with the codes at every third one. Effectively, the cycle of frames-per-code runs:

121

221

322

The "start perf" field is used to describe where in the cycle the keycode lies. The possible entries are as follows:

1 = first foot

2 = second foot

3 = third foot

10.6 Importing Databases

The system described above allows a database to be brought in which was conceived and laid out differently from the Lightworks Logging Database format. Provided the database to import has the required information in it, in any order, addition of the appropriate field labels will allow it to be imported.

The OLEDB header and control parameters can all be left out, too, so that a straight CDF dump from an external database program will provide a legitimate Logging Database, provided the field names are correct.

10.6.1 Comma-Delimited ASCII Format (CDF)

All common databases can export in CDF. Here is an example of an entry in CDF:

“Lightworks”,”74A Charlotte Street”,”London W1”,””,”636 4000”

Each field should normally be surrounded by quotes, and fields are separated by commas. The record is terminated with a standard end-of-line (CR/LF).

If the fields are not surrounded by quotes, then embedded commas will screw up the entire record. Embedded quotes would also do this, and must be repeated:

So quotes within a field are themselves quoted:

"This is a field that says ""HELLO"" to you".

(This will be done automatically by the exporting database - but observe it if massaging by hand).

► Note: Some database programs do not put quotes around numbers, when exporting to CDF. The database will accept such unquoted fields.

The CDF format can also be typed in directly on a word processor, but the process is prone to errors.

10.7 Example Databases

This is a simple but complete OLEDB:

"OLEDB"

"24","8","12","12","9","6","6","24","24","24","64","100"

"text","text","timecode","timecode","text","text","text","text","text","text","text","text"

"name","reel","start time","end time","chans","pic qual","label_std","scene","shot","who","description"

"First shot","999","06:05:48.19","06:06:07.05","V","40","P","174-1","CU","Fred",""

"Second shot","999","06:06:21.10","06:06:56.20","V","40","P","","","A description"

An alternate form, generated automatically by another database program, would be just the final lines:

“Name”,”Reel”,”Start time”,”End time”,”Description”

“168-4”,”B32”,”01:02:13:54”,”01:05:27:03”,”Not good”

“Stuff”,”B32”,”01:06:14:00”,”01:07:02:02”,””

Here is an example of a Film DB (within the OLEDB these would all appear on a single line):

"J-1A","6693A"," 09:00:19;21"," 09:02:56;05","4","VA1A2","40","ND",

"CR3","KJ0943262206+07","1","F16","02:04:17:23","P24","29/04/95","IN0000001234+02","SR4","02:04:17:23","P24","LAB 2", "COMP 2", "bad scene 44","CU","Jim & Chris","single-line description","up to quite a lot of notes"