

# OPTICAL WORKFLOW

The traditional film process can be described as an optical workflow—the process that existed before digital technology. Film was replicated and special effects were created optically.

In a traditional film process, camera negative film is processed and printed so the production company can view the unedited film footage, or dailies/rushes. Today, dailies are more typically viewed electronically, thanks to telecine technology. Faster scanning technology has allowed film-to-digital transfer much earlier in the process, and that is discussed in the Digital Workflow section of this book.

Whether your dailies/rushes are film or electronic, two types are available:

- **One-light dailies** are the most common type, made using the laboratory standard or average printing light. One-light dailies assume the negative is correctly exposed.
- **Timed or graded dailies** are assessed and sent for printing with appropriate printer lights for each camera roll. Not every shot or take in the roll is timed, as would be the case when timing a cut negative to make an approval print. Instead, an average light for that particular camera roll is timed. During timing, the timer typically improves the odd rogue shot in a roll.

With film dailies/rushes, you must select a printing machine exposure that produces an acceptable image. Before timing can take place, however, the rolls of negative must be:

- Logged for identification of shots and takes that may be needed later.
- Cued to activate the printer exposure change.
- Made into roll sizes that are suitable for printing.

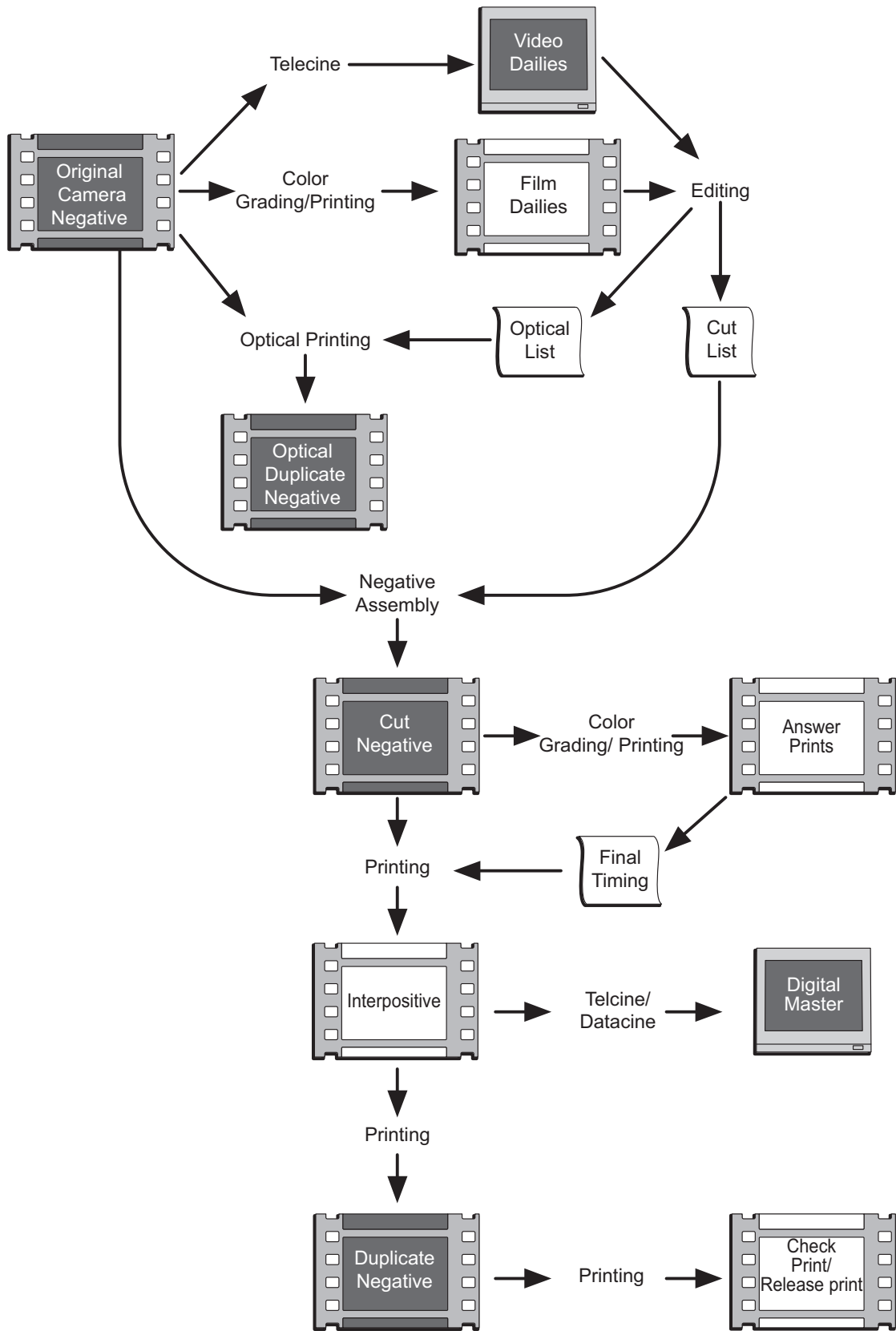
## ***Cueing the Negatives***

A cue tells the printing machine exactly where to make printer light changes, or fades, during printing. When printing cut negatives, they must be frame accurate. Three methods are used, the first two having been largely superseded by the third. They are:

- Notch Cues
- RF Cues
- Frame count cues (FCC)

After color timing, the film is printed. Different printing methods are used for different purposes:

- **Contact Printing** is the most common type. The original negative and the raw stock are printed in contact with each other, emulsion to emulsion. Contact printing produces a 1:1 transfer of the image size, and the printed image is a mirror image of the original.



- **Optical Printing** projects the original image, which is rephotographed in a camera through a copy lens. Optical printing lets you change the image size. Additionally, you can print base side of the original to the emulsion side of the printing stock, which produces the same image configuration as the original. This is useful when inserting a copy into an original negative.
- **Rotary or Continuous Printing** allows a printing sprocket to transport the film at a constant speed across a printing aperture, through which the exposing light beam passes.
- **Intermittent Printing** exposes the film frame by frame while stationary in the printing gate. Intermittent movement of a shutter and register pin is used to position, expose, and pull down the film after each frame of exposure in exactly the same way as a motion picture film camera exposes original film.

Commonly used printers are:

- **Rotary Contact Printers** are used for printing rushes, answer prints, show prints, and release prints.
- **Intermittent Optical Printers** are used for printing titles, special effects work, and for changing image size by blowing up or reducing the image.

## VIDEO DAILIES

Video dailies/rushes are an alternative to traditional film dailies, and they're preferred when the film is intended exclusively for television production or electronic projection. Rather than physically editing the original camera negative immediately following processing, the film is scanned using an electronic imaging device. Telecine or datacine scanners are designed to suit the needs of the lab facility.

## VIDEO DAILIES/RUSHES VERSUS FILM DAILIES FOR THEATRICAL RELEASE

There are advantages and disadvantages to each of these techniques. Basic video dailies/rushes with limited image corrections are generally less expensive than film print dailies. However, the apparent cost savings of video must be weighed against the limitations of the video system in evaluating the images on the monitor. It is often difficult to determine accurate focus and exposure of the negative, for example, and these factors will be very apparent in the final image on a theater screen. Sometimes these problems are not noticeable to the filmmaker until the film footage is cut and printed for release.

Some theatrical releases request both film and video dailies/rushes. The prints are evaluated for scene content and projection quality while the video recordings are sent to the editors. This method provides materials for expedient electronic editing while assuring the director and cinematographer that their negative is suitable.

## VIEWING

After processing, the print is checked by the dailies/rushes department to report to the production company the condition of the material, the quality of the images, and, if required, the quality of the action and sound. Problems that might necessitate retakes are identified before the set is broken or moved to a new location.

After viewing and completing the laboratory report, the print and a written report are sent to the editor. The crew assesses the report before the print is dispatched. The laboratory stores the negative until it is needed for negative cutting after the dailies are edited. The negative is also available to the laboratory for use in making rush reprints of selected rolls or takes for the editor.

## EDITING

The editor receives the film or video dailies and makes the cut. Modern productions use a non-linear digital editing system to keep track of the shots used.

## OPTICALS

Some shots and effects must be created as the editor is working. These are called opticals because traditionally they were made on an optical printer. The editor makes an optical list, or layout, and notes KEYKODE Numbers that match the negative.

Some examples of opticals are:

- Transitions, such as fades (for single strand negative) or wipes
- Reverse motion
- Composite shots (such as a blue screen)
- Titles over picture

Today, opticals are usually created digitally, even when the film is not following a digital intermediate workflow.

### ***Sound Tracks***

Traditional sound recording methods, mixing, and playback have been largely replaced by digital technology, offering significant improvements in audio quality and creative flexibility—and automating much of the process.

In addition to conventional analog photographic audio soundtracks, most 35 mm release prints use one or more types of digital audio sound to enhance the theatrical experience.

Commercial film laboratories and audio post-production studios are equipped with recorders to create the type of sound tracks ordered by the production company for release.

## NEGATIVE CUTTING

Once edited, the final cutting copy of the original film is returned to the laboratory for negative cutting. Often, an edited video copy with a negative cut list is made. The negatives are then assembled and spliced per the editor's directions.

### *Splicing Techniques*

Cut negatives must be spliced together into the desired sequence. There are three techniques commonly used:

**Tape joins**—Films are butted together and clear polyester tape is applied across the join, back and front. This type of join is used for joining prints together, and for editing work.

**Cement joins**—Films to be joined are cut with a common overlap. The emulsion is scraped from one overlap to reveal the film base underneath and film cement is applied. Cement joins result in a clean, permanent join that won't stretch.

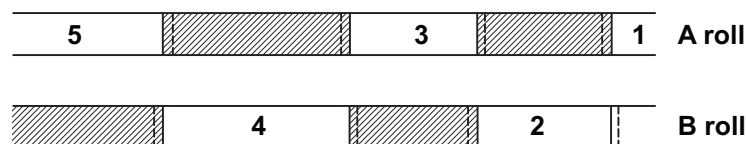
**Heat Weld (Ultrasonic) Splice**—Heat weld splices result in strong permanent joins, which don't stretch. They're not as clean as good cement joins, however, and they're less suitable for acetate base films. Heat weld splices are used for polyester base films, which cannot be joined with film cement.



## NEGATIVE CUTTING TECHNIQUES

### Cutting 16 mm film

16 mm negatives are normally cut as A and B rolls. This involves successive shots being cut alternatively into the A roll negative and the B roll negative. An opaque black leader is joined between the shots on each roll to match exactly the length of the shots in the opposite roll. The layout of a typical A and B roll after negative cutting looks like this:



This negative cutting technique is known as Checkerboard cutting. It's used to conceal the overlap cement splice at each join, which, in the case of 16 mm film with its very narrow frameline, would normally encroach into the picture area. The opaque leader hides the overlap of the splice so that when the join is made, the emulsion is scraped in the picture overlap area beyond the last frame of required picture. The opaque leader, which is not scraped, is laid over the scraped picture up to the frame line and conceals the join during printing.

A print is made in two passes on a printing machine; the A and B roll are printed in succession onto one roll of stock. When negatives are cut and printed as A and B rolls, it is possible to incorporate fades and dissolves by

overlapping scenes on the two rolls and closing or opening a fader on the printing machine at the appropriate time.

NOTE:

- Permitted fade lengths are 16, 24, 32, 48, 64, 96 frames.
- A fade-to-black is achieved by dissolving to clear base.
- A minimum of 6 frames should be allowed between the end of one fader movement and the start of the next, to allow the mechanism to reset.

### **Cutting 35 mm film**

Because the frameline on conventional 35 mm film is much wider than on 16 mm film, it is possible to make overlap cement joins that do not encroach into the picture area; hence 35 mm negatives are normally straight cut in a single roll with A and B rolls used only when fades or dissolves are required (A and B for opticals only).

### **Cueing and Timing/Grading**

Cut negatives must be prepared for printing. During this process, each scene is individually timed and its cue points are identified to tell the printing machine where each scene change occurs and therefore each timing change.

This operation is similar to cueing the dailies/rushes, but every shot and event (fades/dissolves) is cued prior to timing.

### **Cleaning**

Before printing, cut negatives are cleaned in an ultrasonic film cleaner to remove traces of dust and dirt that would appear as white sparkle on the final copy print. Cleaning is essential due to handling during cutting, cueing and grading/timing.

### **Answer Prints**

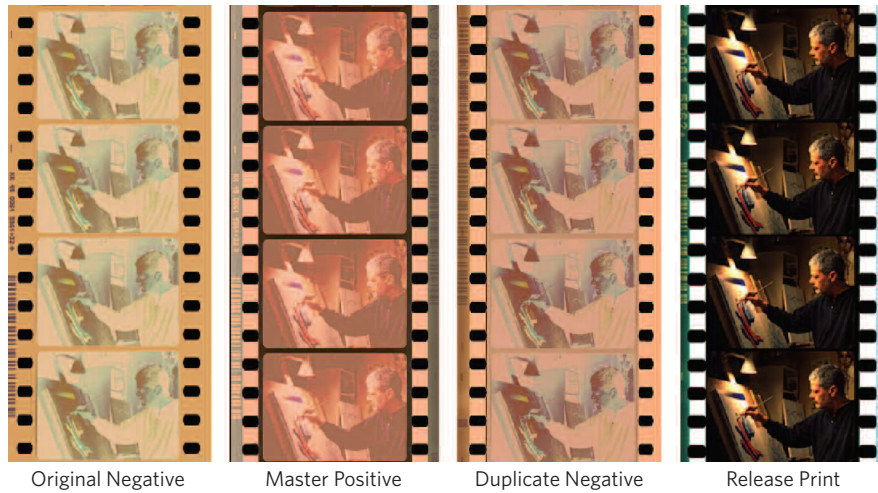
Answer Prints are made from the cut negative after the final cut and after all titles and effects have been added. The laboratory timer in consultation with the director, cinematographer, producer, and/or editor finely times them for color and density. The timing for the answer print is used to make the interpositive, also called IP or Master Positive.

### **Duplication**

After the production company approves an answer print, a master positive, or an interpositive is made. From the interpositive, several duplicate negatives, or internegatives, are made. The final release prints are printed from the duplicate negatives.

- Using duplicate negatives to make release prints protects the original negative from the wear and tear of multiple printing, and provides insurance against damage.

- Multiple language versions, different length or format versions, and simultaneous worldwide release of films all require the existence of duplicate negatives that move between laboratories around the world.
- Scene-to-scene corrections incorporated into a duplicate negative mean it can be one-light printed at high speed. Polyester base duplicate negatives may be used for extra strength when using high printing speeds.



The interpositive is also often scanned or telecined to create the video master for home distribution.

### Check Prints

Check Prints are made from the duplicate negative; they are used to assess the quality of the bulk release work.

### Release Prints

Release Prints are produced in large numbers at high speeds for theaters around the world.

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“Due to budget restrictions, so far we haven’t been able to go with proper 2K scan and realize the full image quality that was captured on the Super 16 negative. But once we have a distribution deal, we will be able to go back to the negative and access the full richness of the images.”

—*Alessandra Piccione, Writer - Producer*

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