CHAPTER 15

Editing Film

The first part of this chapter is about editing projects shot on film the traditional way—using film equipment. The second part is about what has become a more common way of editing film—on video using nonlinear editing systems or linear videotape. See Chapter 1 for an overview of film editing, Chapter 13 for a discussion of editing styles and techniques and Chapter 14 for more on video editing.

TRADITIONAL FILM EDITING

If most people edit film on video, why do it the old-fashioned way? Well, you might be a Luddite and want to cling to low-tech, simpler ways of working. Even if you’re not, there are several good reasons to edit film on film. A film workprint gives the best representation of what’s in the original camera negative. If you edit film you’ll have a better idea of what the movie will look like when printed on film. You may already have film editing equipment and it’s cheaper to keep using it than switch. And you may be one of the many people who feel that the tradition and tactile experience of cutting and splicing pieces of celluloid is an important part of working in the medium. Film is the original nonlinear editing system.

EDITING EQUIPMENT

The editing bench (see Fig. 1-43) is a table that may be equipped with the following:

Cores, Reels, and Rewinds

In the editing room, film is usually stored on camera cores (see Fig. 6-14). Flatbed editing tables (see p. 593) can accommodate core-wound (tight-wound) film. Camera raw stock comes in 2-inch cores, but 3-inch cores are better for editing-room use, as they put less stress on long rolls of film. When the film needs to be put on a reel for projection or for work on an editing bench, it is mounted on a split reel, which is made up of two halves that screw together. A flange is like half of a split reel...
and allows film to be wound on a core. Some flanges allow film to be wound around itself without a core. Short takes are often stored this way.

Handle core-wound film carefully, especially if it’s not very tightly wound. Hold the film flat like a pie, with your palm underneath; otherwise, the center may fall out (dishing). If dishing should happen, find a splice, or make a cut, and separate the two halves. Place the half without the core on the plate of a flatbed editing table and tape the inside end of the film to a core put in the empty center. Run the machine so the plate spins, and hold the outer end of the film in place while the inner part of the load winds onto the core. After both halves are rewound, splice them back together.

Double-key reels have two square holes on each side for mounting the reel onto projectors or rewinds. Single-key reels in 16mm have one square hole and one round hole. The round hole is “idiot proofing” to prevent the film from being loaded in a projector backward, making single-key reels good for release prints but troublesome in the editing room.

A pair of rewinds permit the film to be rewound or searched. Rewinds equipped with a friction or tension adjustment let you increase drag on the feed side to prevent film from spilling (unwinding without control) during rewinding. Drag can also be increased if rewinds develop the nasty habit of rotating by themselves. Use the drag adjustment or your hand to put tension on the film as you rewind it. Leave no slack between reels, because the slack may suddenly be taken up and the film broken. Rewinds may be fitted with long shafts to accommodate more than one reel (as when working with sound). Use an end support if more than four 16mm reels are mounted on a shaft. Use reel spacers or camera cores between reels and use clamps to hold the whole assembly in place (see Fig. 15-1).

![Fig. 15-1. Moviola rewind with long shaft, spacers, spring clamp and support. (J & R Film)](image)

The Viewer (Action Editor)

Viewers (see Figs. 1-43 and 15-2) are helpful for cutting MOS (silent) sequences and for searching rolls for particular shots. The viewer image is generally not sharp enough to judge the quality of the focus on a shot. Use a projector to evaluate footage for focus and quality. Viewers equipped with a built-in sound head or used with a synchronizer (see p. 591) can play sound and picture together.
If you are editing reversal camera original (not workprint), use a viewer with a simple film path to minimize the chance of scratching film. Never put negative in a viewer, and never whip film through a viewer at rewind speeds. The better-quality viewers allow you to mark the frame on the viewer screen with a grease pencil. Avoid devices on viewers that mark the frame by notching or nicking the film.

The Splicer
In the editing room, virtually all picture editing is done with tape splicers that use clear Mylar tape to join pieces of film. During projection, tape splices may throw a couple of frames out of focus at the cut and, over time, the tape may discolor. Forewarn the lab if footage to be printed has tape splices, since ultrasonic cleaning may remove them (see Chapter 17).

You should generally splice on the base side of film to avoid pulling off film emulsion. Splicing on only one side is faster in both making and removing the splice, but some projectors and editing machines will only take picture spliced on both sides (double spliced). Single-spliced picture may jam or jump in these machines. Double splices are stronger and do not stretch (telescope) as some single splices do.

Tape is available in three basic forms: unperforated in rolls, perforated in rolls, and precut perforated. The guillotine splicer (made by various manufacturers) is used with unperforated tape. The tape is stretched over the film and the splicer punches out the perforations. The tape lies across the frame line and is less visible on projection. Some models also have a diagonal cut for sound editing (see below). Unperforated tape is the least expensive, costing about one fourth as much as perforated tape. The splicers themselves are fairly fragile and must be kept clean of glue and punched perforations. The tape is relatively thin, allowing it to pass through projectors well, but splices may telescope over time.

Perforated tape in roll form is used in 16mm and 35mm with the Rivas or Hollywood Film splicers. Some models cut the tape straight, along the frame line, making the physical cut less obvious than on those models that cut with a jagged edge that rests in the picture area. In either case, the tape is fairly thick and is noticeable upon projection. These splicers need less maintenance than guillotine splicers and do not leave little punched perforations to gum up the works. Precut splices, the most expensive of the tape splices, are made primarily for the amateur market. They are very thin, easy to remove, and make the best-quality splice for picture, but are relatively slow to apply and are not often used in the professional editing room. Kodak Prestapes show in the picture area but can be cut with
Fig. 15-3. Splices. (A) 16mm cement splice (shown here) extends into one frame. Cement splices in 35mm do not show up in the picture area. (B) Tape splice that extends past the frame line. (C) Tape splice that falls on the frame line. (D) Tape splice on a Rivas splicer showing jagged edge. (E) Diagonal splice on magnetic sound film made with a Rivas splicer. (F) Tape repair of torn perforations. (G) Super 8 guillotine tape splice that does not cover the main magnetic sound stripe but does cover the balance stripe.

scissors to make a splice that extends only to the frame line. They make the least noticeable splice of any and are sometimes used in emergency situations (as when original must be spliced without losing frames). Precut splices may be used with a Rivas splicer or an inexpensive splicing block, a grooved block with registration pins to hold the film and a slot to guide a single-edged razor blade for cutting.

Check each tape splice you make. Remove air bubbles by rubbing. Trim tape that overlaps the edge of the film (which happens with dirty guillotine splicers or poorly manufactured perforated tape) with a razor blade or sharp scissors; otherwise, the film may jam during editing or projection. See p. 600 for splicing mag sound.
CEMENT SPLICERS. Cement splicers are primarily used for splicing negative before printing and for fixing or joining reels of release prints. A cement splice is made by scraping the emulsion off one shot and then bonding the bases of the two shots together with fresh film cement for a strong union. One frame is lost where the emulsion is scraped at each cement splice.

Newer cement splicers should cut into only one of the frames at the splice. Negative splices are slightly narrower and cover less picture area than positive splices, but, when properly made, are as strong. In 35mm, the cement splice is outside the projected picture area, so the splice does not show on projection. In Super 8 and 16mm, on the other hand, the splice does cut into the picture area and is visible on projection. A & B roll printing allows cement splices to be hidden in the smaller gauges (see Chapter 17). Consult Appendix I for techniques of cement splicing.

The Synchronizer

A synchronizer keeps film and sound track(s) locked together in the exact same relation to each other as you move from one part of the film to another. A synchronizer has one or more sprocketed wheels, called gangs, mounted on a revolving shaft. Sound and picture are mounted on separate gangs and are kept in sync frame by frame. You can mount a sound head to reproduce the sound through an amplifier and speaker (squawk box). If you also use a viewer, place it a standard number of frames from the sound reader and find a point where picture and sound are in sync. Place a point on the sound (like a slate or start mark) under the sound head, and place the corresponding point on picture in the viewer gate. To get decent sound

Fig. 15-4. Moviola four-gang synchronizer. The fourth gang is shown with a magnetic sound head attachment. The dial on the first gang is an adjustable frame counter. Most synchronizers also have a footage counter; this one has a time counter. (J & R Film)
reproduction, the film has to be cranked at around 24 fps. Synchronizers are available with gangs of different gauges—for example, one 16mm and one 35mm gang.

Fig. 15-5. Hervic/Minette Super 8 editor/viewer. (Hervic Corp.)

Fig. 15-6. Moviola six-plate flatbed editing table. (J & R Film)
Flatbed Editing Machines

Flatbed editing machines (sometimes called editing tables) are preferred for editing 16mm and 35mm films. Popular flatbeds have been made by Steenbeck, KEM, and Moviola. A six-plate editing table has three film transports and allows you to run one roll of picture along with two sound tracks. An eight plate gives you the possibility of two picture and two sound reels (see Fig. 15-7). With an eight-plate you can put the dailies on one pair of transports and the edited sequence on the other pair, making it very easy to search for shots and then splice them into the movie. You could also run one picture reel with three sound tracks. Some flatbeds are modular (for example, the KEM Universal), allowing the machine to be expanded to various combinations of sound and picture heads.

When editing on a flatbed, be sure to project your film on a theater screen as well to check for image defects that aren't visible on the small screen and to get a sense of pacing.

Fig. 15-7. Steenbeck eight-plate flatbed editing table. The model pictured is set up for editing 35mm picture with 16mm sound. (Steenbeck, Inc.)

MATERIALS AND SUPPLIES

Leader and Fill

Blank film for threading and writing information on, called leader, should be attached to the beginning (the bead leader) and the end (the tail leader) of every roll of film.
dailies, camera original, magnetic film, assembly, and outtakes. Use at least five to six feet of leader at the beginning and end of each roll and write on every leader the film title, name of production company, and roll number, as well as “head” or “tail,” depending on its position in the roll (see Fig. 15-11).

**Acetate leader** is usually the least expensive and has a dull emulsion and a shiny base. Hold the film obliquely to a light source to distinguish the dull from the shiny side, or place the leader or film between slightly moistened lips or fingers to see which side sticks, the sticky side being the emulsion. **Polyester leader** has no emulsion (both sides are shiny) and is available in a range of colors.

**Slug** or **fill** is unwanted film footage used to replace damaged sections or to prep soundtracks for mixing. Discarded release prints used to be available from the lab to be used as filler, but copyright fears have reduced this practice.

Leader and slug are available in 16mm, both single- and double-perforated. You can use double-perf leader as head or tail leader only if everything on the roll is double-perf. Otherwise, use single-perf so that the film will not be threaded incorrectly and rip the single-perf sections. Because mag film is single-perf, 16mm magnetic film must have single-perf head and tail leaders. Use single-perf slug in mag film rolls, because double-perf slug may cause head wear and unwanted noise. Single-perf leader enables you to distinguish easily when a roll is head or tails out. Because of the advantages of single-perf, some editing rooms use only single-perf leaders and fill. When using magnetic film with leader or fill that has an emulsion side, make sure you splice the emulsion side of the leader to the base of magnetic film to avoid having the emulsion clog the sound heads. Avoid shrunken leader or film; it may chatter and jam during projection.

**Other Supplies**

Mark your workprint with China marker (grease pencil), which rubs off easily. White and yellow are the easiest colors to see on picture. Using grease pencil on sound can clog the sound heads. Use editing gloves when you handle original or any footage that needs special care to prevent skin oils from getting on the film. Other supplies include splicing tape, fresh film cement, sharp scissors, single-edge razor blades, film cleaner and cleaning felt, masking tape, tape for marking cans, indelible marking pens, and a hole punch.

**FILM EDITING PROCEDURES**

**Handling Film Footage**

Most films are edited with workprint, in which case the camera original should not be stored in the editing room. However, some Super 8 and 16mm films shot on reversal stock are edited with the original. Original material is irreplaceable and needs special care. If you are in doubt about whether a piece of reversal film is original or workprint, you can generally distinguish the workprint by looking at the key numbers (latent edge numbers). Original is almost invariably B-wind (see Fig. 7-10) and has key numbers that read through the base. Reversal workprint is A-wind, and its key numbers read through the emulsion. When working with camera original, keep the editing room clean and dust free. But workprint, too, should
be kept as clean as possible. At the end of each day’s work, cover the tables and bins with plastic. Keep the floor, in particular, clean. Don’t allow food and smoking in the editing room.

Hold film by the edges to avoid getting skin oils on the picture or sound oxide. Store rolls in cans or boxes (you can get special cardboard boxes that hold a roll of picture and sound). Cinch marks are caused by pulling the end of a loosely wound roll to tighten it. Pushing down on the center of a tight-wound roll that has started to dish will also cause cinch marks.

A clean workprint allows you to judge the film better. It’s likely that you’ll show the film during the workprint stage to nonfilmmakers—investors, trial audiences, or distributors—who may have little understanding or tolerance for scratched and dirty film. When cleaning a film for a screening, use any of several commercially available cleaners, such as Kodak or Ecco film cleaner. Slightly moisten a lintless cleaning pad or felt with cleaner and sandwich the film in the folded pad as you slowly wind the film from one end to the other. Hold the pad near the feed reel and go slowly enough so that the cleaner will evaporate before the film is wound on the take-up reel; otherwise, there will be a mottle on the film, which can usually be removed by cleaning the film again. Reposition and clean the pad often to avoid the buildup of dirt that may scratch the film.

Assembling Sequences

Like all types of editing, film editing involves going through the rushes or dailies to select shots you want to use, then putting them together in an edited sequence. Like nonlinear video editing, film editing allows you to add or delete shots from the sequence at any point. When removing a shot, you can cut it out and re-splice the roll, shortening the sequence. Alternately, you might choose to remove a section of picture or sound and replace it with leader or fill (called slugging) to maintain the previous length of the sequence and the sync relationship with the other track(s).

When measuring a length of leader to replace a shot, there are several ways to ensure the two pieces of film are the same length. You can hold the two next to each other to mark the length or put them in a synchronizer. Many editing tables have a frame counter much like a yardstick, on which you can measure frames. You can also use a flatbed’s film transports to measure out longer pieces. Put the leader in one of the sound transports, and mark the first frame of leader opposite the first frame of the shot you want to take out. Roll the film forward to the last frame and mark the leader accordingly. On some flatbeds you mark the picture frame that is centered in the picture head and the sound frame that’s directly on the sound head. On some machines, like many Steenbecks, you can get a more precise alignment by pulling the film down against the rollers on the side. Have someone show you the proper threading for this.

While editing sequences, individual shots can be hung on pins in a trim bin (film bin). Some editors put the shots in order in the bin before splicing them into a sequence. As noted above, when working on an eight-plate flatbed, it’s easy to take shots directly from the dailies to the rough cut without hanging them in bins first. Some people like to use two flatbeds—one to search footage and the other to run the edited cut.
Trimming and Reconstituting

When you remove an entire shot or a section from the head or tail (a trim), hang it in a trim bin. Keep the bin organized by sequence or by edge code number so you can find footage when you want it. On feature films, editors may use trim tabs or cinetabs, which are small slips of cardboard hung in the bin to identify the shot on a given pin.

Fig. 15-8. Trim bin. You can make your own bin by bolting a wooden rack to a trash can lined with cloth or plastic. (J & R Film)

Footage not being used is considered outtakes or outs, but many shots will alternately be part of the ins and the outs as you experiment with the rough cut. One way to keep track of outs is to reconstitute them—that is, return them to their workprint rolls. Use ink edge code numbers or key numbers to determine their proper order. If the footage has sync sound, reconstitute in sync. It’s helpful to have trims accessible in the bins, but the bins should be reconstituted periodically when they get cluttered. Arrange shots on pins in order by edge number before putting them back into the outtake rolls. You’ll find that you can locate many shots that have mysteriously disappeared by looking at the bottom of the bin. When moving bins, tape the ends of the pins so shots don’t fall off.

Successive fine cuts create their own outtakes. Incorporate these outtakes into the first outtake rolls; otherwise, if a trim roll is made for each version, it becomes difficult to find the extension of a particular shot, since it could be on any one of a number of rolls. It is easy to locate the extension of a shot if all the outtakes are reconstituted by edge number.

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Things to Watch Out For

FLASH FRAMES. Check the beginning and end of each shot for flash frames (overexposed frames caused by the camera stopping with the shutter open or when the camera changes speed at the beginning or end of a take). Hold the end of the shot up to a white wall or a light box and look for variations in exposure. You must check carefully, since often a drastically overexposed frame is surrounded by several subtly overexposed ones. If you see a slight flashing at cuts when viewing the movie, this may mean you’ve left in some flash frames.

CUTTING FRAMES. When the negative is cut prior to printing, at least one cutting frame (also called cutback frame) is needed at the head and tail of each shot to make the cement splice (see Chapter 17). If you are using two parts of the same take (a split shot), delete and put aside some frames of workprint between the two shots to allow for the cement splice. Some negative cutters lose only one frame, especially if they are warned that it is a split shot, but others, as a matter of course, leave a frame or more at each end of every shot pulled from the original. To be safe, you may want to leave three or more unused cutting frames between the shots. The number of unused cutting frames is sometimes called the cut margin.

FADES AND DISSOLVES. Unless blowups or other special printing is needed, films are generally printed on contact printers (see Chapter 17). Contact printers usually make fades and dissolves in lengths of 16, 24, 32, 48, 64, or 96 frames. Optical printers are not restricted in fade lengths. Check with your lab to see what is available. A 48-frame fade or dissolve is fairly standard. The first and last quarters of these effects often show little noticeable change (that is, the first 12 frames of a 48-frame fade-in look dark, the last 12 have nearly full exposure), so they seem to go by quicker than the frame count would suggest. If one shot is to dissolve into another, find the overlapping frames. For example, a 48-frame dissolve has a 48-frame overlap, 24 frames from each shot (see Fig. 15-9). Check the overlap to make sure there are no flash frames or unwanted movements. Store the workprint of the overlap frames in a special place so it can be checked at any time for sufficient length. Too often, the negative cutter comes across a marked dissolve on the workprint and cannot find the extension in the original.

SHOTS WITHOUT KEY NUMBERS. Short shots (those fewer than 20 frames in 16mm) may not have a key number (see Fig. 7-11). Write the closest key number on the shot in grease pencil to aid the negative cutter when he or she is conforming (see Chapter 17). If for some reason an entire roll lacks key numbers, this may be a workprinting error (see p. 663) or because the original lacks key numbers. Consider having ink edge code (see p. 602) applied to the original and workprint before editing. Workprint without key numbers can be matched to the original by eye, but this is very difficult if the location of the shot on the roll of the original is not known. Shots with a lot of camera or subject movement are the easiest to eyeball. Find frames with distinctive movement, line up the original and workprint in a synchronizer, and roll them in sync to find the head and tail of the shot.
Fig. 15-9. Dissolve. Trim and put aside the workprint extensions of both shots to be used in a dissolve. A 48-frame dissolve needs a 24-frame overlap from each shot. This is similar to the idea of needing handles on each clip to make a dissolve on an NLE. (Carol Keller)

FOOTAGE FROM DIFFERENT SOURCES. On some productions, stock footage (archival or library footage) is edited with workprint footage from camera original. Sometimes the stock footage is of the wrong wind and will either project flipped or will have to be spliced in base-to-emulsion and will be out of focus during projection. When you use stock footage, be sure the footage is available in a wind that will match the camera original (B-wind). Workprint is usually A-wind. Check the stock footage for wind and, if it is B-wind, send it to the lab to be workprinted or, if it is A-wind, to be duped to change winds. Check frame lines on stock footage to make sure they match the camera original (see p. 251). Sometimes optical printing must be done to correct significant differences. If stock footage has no key numbers, edge code it and its copy for negative matching. If you are using only some of the stock footage, it is sometimes less expensive to do clip-to-clip printing (see Chapter 17).

EDITING 16MM AND 35MM. There are certain important numbers to keep in mind when editing film, and the numbers vary from 16mm to 35mm. It can sometimes get confusing when moving back and forth between the formats (for example, when printing a 16mm film on 35mm). Both formats run at 24 frames per second, but the 35mm frames are physically larger. Thus there are 40 frames per foot in 16mm and the film runs at 36 feet per minute; but there are only 16 frames per foot in 35mm and the film runs at 90 feet per minute (which is 2½ times faster). A 20-minute reel in 16mm is 720 feet; in 35mm it is 1800 feet. You can make the conversion in footage using a special editing calculator like a Reddy-Eddy, a 16/35 synchronizer (just dial the footage in one format and read the equivalent in the other) or by using any hand calculator.1

1. To convert a 16mm shot that is 10 feet, 3 frames long, to 35mm footage, start by converting the shot length to frames. 10 feet x 40 frames/foot = 400 frames; now add the extra 3 frames to get a total of 403 frames. 35mm has 16 frames per foot. 400 frames ÷ 16 frames/foot = 25.18 feet, or 25 feet, 3 frames.
REEL LENGTH. Films are divided into manageable lengths for editing, mixing and printing called reels. A typical film will be made up of several reels. In 16mm, reels more than 1000 to 1200 feet (27 to 33 minutes) are awkward to work with in the editing room. Though it is possible to print 16mm in longer lengths, some labs prefer that reels not exceed 1200 feet to minimize handling damage. The standard 35mm editing reel is about 10 minutes (1000 feet), though 35mm films are generally printed and released on 2000-foot reels (22 minutes). Talk to the lab and mixing facility for their preferences. If you’re cramped for space on the reel, remember that the head and tail of the reel are reserved for printing leaders; the movie itself can’t be as long as the reel. When you’re done editing, the reels need to be balanced, so each reel is full (or nearly so) with the last reel shorter if necessary. Be attentive to the scenes at which reel breaks take place, particularly the first scene on a new reel. Avoid having reel breaks in midscene or where music is playing or before scenes with important information (in case the projectionist messes up the transition from one reel to the next). The heads and tails of reels tend to get a lot of wear and tear, so try to avoid very light scenes which show dirt more.

After a film is printed, the reels are often spliced together for projection or shown alternately on two projectors, using a changeover device. See 35mm Release Prints, p. 687, for inscribing changeover marks on the release prints. See p. 691 for special precautions when preparing sound tracks for multireel films.

MAGNETIC TRACKS AND SYNCHING DAILIES

Sound Transfer

Sound is recorded during production with an audio recorder using one of a variety of formats—hard drive, memory card, 1/4-inch tape, DAT, etc. In traditional film editing, the audio is then transferred to sprocketed magnetic film (also called mag stock or mag) for editing with the picture.

In 16mm, editing is done with fullcoat, which has sprocket holes like camera film but, like audiotape, is covered on one side with a brown or black oxide for recording the sound. In 35mm, editing may be done with stripe, which looks like clear camera film but has a thin strip of oxide for the sound and a balance stripe on the other edge.

Sound transfers may take as long as two hours to transfer one hour of tape. Sound is usually transferred while the picture is being processed. Sound is transferred by playing the original sound and rerecording it on a magnetic film recorder, or dubber. (The word dubbing comes from “doubling”—that is, “to copy.” Dubber is sometimes used to mean a machine that only plays back magnetic film.) Many modern recording devices have precise speed control, but older tape machines will need to be resolved to ensure proper speed during transfer. For more on resolving, see Speed Control for Sync Recording, p. 389.

If a reference tone was recorded on the original tape, use it to set the recording level during transfer. The transfer level will normally be set so that the tone reads 0 dB on the transfer equipment’s VU meter. But the reference tone is just a starting point; the level needs to be checked on the actual program material. If the transfers
are being done by someone else, warn them of any unusually loud or quiet passages on the tape. Sometimes, a minimal amount of equalization is done during transfer; perhaps to roll off (reduce) low-frequency wind or rumble.

Handling Magnetic Tracks

As noted above, when splicing leader into the sound track, splice the emulsion side of the leader to the base side of the mag film. To prevent mithreading, use only single-perf leader for sound rolls, especially at the head and tail.

Tape splicers designed to cut picture usually work fine with mag film. Sometimes white sound splicing tape is used instead of clear tape, because it is easier to see on the mag film and it may not stretch as much, thereby avoiding sound dropouts. While picture is sometimes double-spliced (that is, taped on both base and emulsion sides) for greater strength and rigidity, never splice the oxide on magnetic stock, or sound reproduction will be interrupted.

Many editors cut 16mm sound on the diagonal, using either a diagonal Rivas splicer or a guillotine splicer equipped with both straight and diagonal cutting blades (see Fig. 15-3). (Note: various makes of diagonal splicers cut at different angles; film cut with one often cannot be butted to film cut with another.) If a straight splice stretches or is badly made, when it passes over the playback head, there will be a brief moment when no mag film makes contact with the head. A diagonal splice, on the other hand, even if slightly stretched, ensures that some mag film will contact the head, thus minimizing dropout. A straight cut at the beginning of a loud section of track can sometimes produce a popping or clicking sound; the same can happen if the mag film or splicer is magnetized. Diagonal cuts minimize these effects. The main drawback of diagonal splices is that if you are using the Rivas sys...
tem, you will need to use two splicers. If noisy splices indicate that your splicer is magnetized, demagnetize it immediately with a bulk eraser or a hand degausser. Make several test splices on blank mag film, and listen closely with the playback volume all the way up. This is best done on a dubber to avoid being misled by mechanical noises at the splice (which are heard on some flatbeds).

**Synching Up**

When shooting with a video camera, sound and picture are usually recorded together right on the videotape; they are already in sync and ready to be viewed or edited. When shooting film, picture and sound are recorded separately (double system), and the picture has to be put back together with the sound before editing begins. This process is called *synchronizing the dailies*, *synching the rushes*, or, more commonly, just *synching up* (pronounced “sinking”). When synching is complete, every sync-sound shot on the picture is matched frame for frame to the sound track; each roll of picture has a roll of mag film of equal length that can be played back with it.

In most sync filming, there is more audio recorded than picture. This is because the sound recorder is turned on before and off after the camera and because other wild sound (perhaps for sound effects) is recorded when the camera is not running. (Of course, there is also a certain amount of MOS—silent—picture.) Some editors remove all the wild sound during synching and spool it up on separate rolls. Others leave most of it in place and splice the same length of leader or fill into the picture to keep it even with the sound roll. In general, no footage should be removed from the picture roll during synching unless absolutely necessary: moving picture from one roll to another can result in confusion when searching for footage, and throwing picture away is often regretted later.

Synching up requires an editing machine such as a Steenbeck or Moviola, or an editing bench equipped with rewinds, a synchronizer, viewer, sound head, and amplifier. There are many methods of synching up; one is outlined in Appendix G.

In 16mm, two 400-foot camera rolls are usually spliced together during synching to form one roll for editing, which fits comfortably in a 1000-foot capacity can. Longer rolls can be difficult to handle during editing, resulting in wasted time when searching for a particular shot. When the synching is complete, each roll should have one set of start marks (see Fig. 15-11) at both the head and tail, along with proper labeling so that footage can be easily identified and put in sync when needed.

![Fig. 15-11. Properly marked head leaders for editing. The start marks are the X's that cover one frame only and are directly opposite each other on picture and sound. (Carol Keller)](image_url)
Many people find synching up complicated at first and later wonder why it seemed so confusing.

**Slates, Accuracy, and Lip Synching**

Most double-system sync footage is filmed with the help of a slate, whether it be a clapper board, digital slate, slate light, or a microphone tap (see p. 435). When synching up a slated shot, be sure to line up the first point in the picture where the slate makes contact and the first point where it is audible in the sound. Sometimes the picture slate occurs between frames. Simply line up the exact point where you think the slate occurred in the picture with the first point where you can hear it on the sound track and then shift them slightly so that the two closest frames line up. Sound that is slightly late relative to the picture is often less objectionable than sound that is slightly early.

If audio has been recorded with a timecode-capable audio recorder and filming has been done with a timecode slate or in-camera timecode (see p. 438), synching can be done by matching the timecode in picture and sound. This is typically done when synching double-system material for video editing.

At some point you will undoubtedly have to sync up a shot that has not been slated. To do this, find a surrogate slate in the scene—the closing of a door or an object being placed on a table. Learn to sync up the movements of people’s lips with the sound of their words. Look for words that contain hard labial sounds like $b$ and $p$ for which the sound becomes audible just as the lips part. The $m$ sound can be used, but it is not as precise. After approximate sync has been determined, experiment by sliding the picture two frames ahead or two back to see if you can improve synchronization. Then try moving it one frame each way. A sync error of one or two frames is usually noticeable to attentive audiences. Syncing should be checked carefully (preferably by projecting dailies on a big screen) before edge coding (see below). Sync errors detected after coding are annoying, and after a print is made, very upsetting!

**Edge Code (Ink Edge Numbers)**

After the workprint has been synched up, an edge coding machine can be used to print identical ink numbers along the edge of the picture and sound rolls (see Fig. 15-12). By lining up the numbers, you can instantly ensure that the picture and sound for any shot are in sync. Also, the numbers allow you to quickly find any section of mag film, which is otherwise hard to do. These numbers are variously called edge code, edge numbers, ink edge numbers, machine edge numbers, rubber numbers, or Acmeade numbers (after one brand of coding machine). They all mean the same thing. Don’t confuse edge code with timecode or keycode (see Key Numbers and Edge Identification, p. 271).

In 16mm, edge code is printed every 16, 20, or 40 frames, depending on the setup of the coding machine. In 35mm, code is usually printed every foot (16 frames). There are different numbering systems; one system uses two letters followed by four digits (such as AA1234). Another format uses an eight-digit prefix, a four-digit footage count and a two-digit frame count (AB904434-1428 + 10). Whatever system is being used, indicate a starting code for each roll when submitting the footage to the lab or coding facility. Every pair of sound and picture rolls
will then have the same set of numbers printed on them. On some productions, an edge-coding machine is rented for the editing room.

When you get footage back from being coded, put the sound and picture in a synchronizer or editing machine and check that the numbers are in sync with your start marks and that they run continuously without errors from the head of the roll to the tail. On some machines, the ink can occasionally spread into the picture area. In general, ink numbering on the original should be avoided.

**MARKING WORKPRINT AFTER PICTURE LOCK**

When you’re done editing (and the picture is locked or “frozen”) the workprint is marked with grease pencil to indicate to the negative matcher how various splices are to be treated:

| Tail | F.I. 24 | Shot 2 | Shot 1 | Head |

Indicates that shot 2 should begin black and fade-in to normal exposure. A 24-frame fade-in is indicated here.

| Shot 2 | F.O. 24 | Shot 1 |

Indicates that shot 1 should begin with normal exposure and fade-out to black. As marked, shot 2 would begin with normal exposure.
Indicates a dissolve between shots 1 and 2. Note that this is simply a fade-out that overlaps a fade-in.

Indicates a double exposure of shots 1 and 2 so that both will be visible simultaneously. This marking is also used for superimposed titles. The beginning and end of shot 2 are cut and spliced into their proper place, indicating the extent of the double exposure. Include enough frames so that there is a key number in each piece.

The extended scene marking is used when a piece of workprint has to be replaced with leader because of torn or damaged frames. The arrow indicates to which scene the frames of leader belong.

The unintentional splice mark indicates that a shot has been cut in editing and then put back together, so no cut should be made in the original (normally, the negative matcher will plan to cut the original anywhere he finds a splice in the workprint). A careful matcher should check to make sure all splices are intentional regardless of the mark. You can make splices even clearer by putting vertical lines down the center of all intentional splices. It is a good idea to put vertical lines to mark the extent of fades and dissolves and to write their lengths in numbers on
APPENDIX F

A COMPARISON OF RUNNING TIMES AND FORMATS OF 8MM, SUPER 8, 16MM, AND 35MM MOTION PICTURE FILMS
### Running Times and Film Lengths for Common Projection Speeds

<table>
<thead>
<tr>
<th>Film Format</th>
<th>8mm (80 Frames per Foot)</th>
<th>Super 8 (72 Frames per Foot)</th>
<th>16mm (40 Frames per Foot)</th>
<th>35mm (16 Frames per Foot)</th>
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</thead>
<tbody>
<tr>
<td>Projection Speed in Frames per Second</td>
<td>18</td>
<td>24</td>
<td>18</td>
<td>24</td>
</tr>
<tr>
<td>Runnig Time and Film Length</td>
<td>Feet</td>
<td>Frames</td>
<td>Feet</td>
<td>Frames</td>
</tr>
<tr>
<td>Seconds 1</td>
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<td>18</td>
<td>0</td>
<td>24</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>36</td>
<td>0</td>
<td>48</td>
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<td>16</td>
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<td>7</td>
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<td>8</td>
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<tr>
<td>8</td>
<td>1</td>
<td>64</td>
<td>2</td>
<td>32</td>
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<tr>
<td>9</td>
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<td>108</td>
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<td>10</td>
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<td>180</td>
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## Typical Running Times of Films

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<tr>
<th>Film Format</th>
<th>8mm</th>
<th>Super 8</th>
<th>16mm</th>
<th>35mm</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Projection Speed in Frames per Second</strong></td>
<td>18</td>
<td>24</td>
<td>18</td>
<td>24</td>
</tr>
<tr>
<td><strong>Inches per Second</strong></td>
<td>2.7</td>
<td>3.6</td>
<td>3.0</td>
<td>4.0</td>
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<td><strong>Film Length and Screen Time</strong></td>
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<td><strong>Min</strong></td>
<td><strong>Sec</strong></td>
<td><strong>Min</strong></td>
</tr>
<tr>
<td>50</td>
<td>3</td>
<td>42</td>
<td>2</td>
<td>47</td>
</tr>
<tr>
<td>100</td>
<td>7</td>
<td>24</td>
<td>5</td>
<td>33</td>
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<td>11</td>
<td>7</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
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<td>14</td>
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<td>11</td>
<td>7</td>
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<td>1600</td>
<td>—</td>
<td>—</td>
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</tr>
</tbody>
</table>

### Number of Frames Separation Between Sound and Picture

<table>
<thead>
<tr>
<th></th>
<th>8mm</th>
<th>Super 8</th>
<th>16mm</th>
<th>35mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnetic Track</td>
<td>56</td>
<td>18</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>Optical Track</td>
<td>—</td>
<td>22</td>
<td>26</td>
<td>20</td>
</tr>
</tbody>
</table>

Figures in the table are for reel-to-reel projection in which the sound precedes the picture.

The speed of 25 frames per second is used for 16mm TV films, and increasingly for other 16mm sound films, in 50 Hz countries.

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This is a method for synching sound and picture for projects shot on film and edited using workprint and mag film. For synching in video on a nonlinear editing system, see p. 573.

1. Load the workprint and the mag film in the synchronizer or editing machine. They are usually loaded on the left so that the forward direction is from left to right. For this discussion, it’s assumed the material is set up in this way.

2. Use the filmed slate or other point of reference as a guide for putting the sound and picture for the first shot in sync with each other (see Slates, Accuracy, and Lip Synching, p. 602). This requires shifting the position of the rolls with respect to each other.

3. Once the first shot is in sync, move the workprint and the mag film backward (to the left) to the head (beginning) of the picture roll. On the right-hand side of the machine cut off any excess laboratory leader on the picture (although if it contains the lab order number for the roll, you may want to leave that part) and trim the sound roll at the same spot. Splice on about 6-feet of plain, single-perforated leader on both rolls. Anytime you splice leader or fill onto the sound, make sure it is positioned with the base toward the sound head.

   Continue moving backward onto the leader about a foot or so, and mark a start or head sync mark with a Sharpie at the same frame on both rolls (see Fig. 15-11). At the head of the leaders write your name, the name of the film, the camera roll number, and either “head pix” or “head track” on the picture and sound, respectively.

4. Move the picture and sound forward to the end of the first shot. The end can usually be located by the flash frames—overexposed frames that occur when the camera stops between shots. Mark both sound and picture with the number 1 at the same frame.

5. Go forward and sync up the second shot. You will again need to shift the sound and picture relative to each other to accomplish this.

6. After the second shot is in sync, roll the sound and picture backward together to the number 1 you just marked on the picture. Mark a second 1
on the sound at the same frame. Search through the sound roll by hand to find the first 1 you marked on it.

7A. You will usually find the first 1 toward the head of the roll (to the right), which occurs whenever there is more sound than picture (normally the recorder runs longer than the camera). Move both rolls slightly to the right, and cut the sound from the left-hand edge of one of the frames marked 1 to the left-hand edge of the other (for consistency's sake, always cut on the left-hand edge of a marked frame). Splice the sound roll back together, and hang the wild sound you have just removed on a bin or spool it up on a separate roll.

7B. If, instead, you find the original 1 toward the tail (end) of the roll (to the left), this indicates that there is not enough sound to cover the picture (perhaps because the audio recorder started late on the second shot). Cut a piece of leader that is the same length as the distance from the left-hand edge of one 1 to the left-hand edge of the other. Often you can use the editing machine or synchronizer to measure the leader quickly. Splice the leader at the appropriate frame marked 1; this will depend on whether the first or the second shot has insufficient sound. When you've finished, both the first and second shots should be in sync; realign them if necessary.

8. Now go forward to the end of the second shot, and mark it with a 2 on the same frame of both sound and picture.

9. Return to step 5; this time you will be synching up the third shot, and so on.

10. At the tail of the picture roll, cut the sound at the same spot and splice tail leaders on both rolls, marked as before but with tail sync marks and “tail pix” and “tail track” written on the leaders.

This method is fast and leaves a string of wild sound in which each piece is marked according to the shot from which it was removed, which helps in identifying it later. If you prefer to leave any wild sound in the sync rolls, you can do so simply by splicing the same length of leader into the picture at the corresponding spot.
This section is for people doing film projects that are edited in film with workprint and magnetic film. It describes a method for splitting mag film tracks during sound editing in preparation for the sound mix. See Chapter 16 for guidelines on how and why to split tracks. See Chapter 15 for handling mag film tracks. This discussion is strictly about the physical chores involved in dividing up the mag tracks.

Split mag tracks are a little like A&B rolls for printing picture (see Fig. 17-4); on each roll, sections of mag film alternate with sections of nonmagnetic leader that act as spacers. Clean, unshrunken slug or fill is usually used for this purpose. Splice so the base of the slug is toward the sound heads (meeting the emulsion side of the mag film).

Before setting up to split tracks, you should have already gone through the film and marked the splices where tracks are to be split (see p. 603 for more on this). Tracks can be split on a flatbed editing machine, but it is far easier to use an editing bench with a synchronizer and rewinds. Put the edited sound track rolls on the left. Also put on the left as many rolls of leader as you will ultimately have tracks. This is limited by the number of gangs on your synchronizer; the rolls may have to be done in two or more groups. It’s crucial to load up the picture also so you can check for cutting errors.

Put all the rolls in sync on the synchronizer. At the head of each roll, splice about 15 feet of single-perf white leader that is properly labeled with production company name, film title, “head,” and the track letter (some people identify tracks by number, not letter).

Only on the picture roll, splice a Society of Motion Picture and Television Engineers (SMPTE) head leader between the first frame of picture and the white leader. SMPTE or Society leader (sometimes called Academy leader, which is actually a different system) contains the familiar countdown from 8 to 2, followed by a short section of black leader (see Fig. 17-8). If you can’t get SMPTE leader from the lab, you can fake it by marking the proper frames on your own leader. The frame at 8 is marked “Picture Start”; this is a good point at which to synchronize all the rolls. Use a hole punch (available at stationery stores) to punch the same frame on each of the sound rolls. On the 144th frame after the picture start (that is, 3 feet, 24 frames in 16mm; 9 feet in 35mm) is the 2 frame. This frame should be spliced out on the
sound rolls only and replaced with a frame that has a distinctive tone (about 1000 Hz is standard) or, more simply, left in with a stick-on sync beep (also called a sync pop or pip) applied to the track area. In the United States, the track is located in the top quarter of the oxide on the side that has no sprocket holes.

When the film is projected, all the tracks should beep when the number 2 appears on screen, which tells the mixer that all the tracks are in sync, and, if he listens to them individually, that all the tracks are audible. The sync beep is also necessary for lining up the optical track in printing. The first frame of the movie appears on the 192nd frame after the “Picture Start” frame (4 feet, 32 frames in 16mm; 12 feet in 35mm).

Mix dubbers run at high tension. Rivas splicers, which use preperforated tape, make stronger splices than guillotines and should be used for the final splicing if possible. For mixing and printing, films are broken down into segments of convenient length called reels. See Reel Length, p. 599, for more on reel breaks.

If the film will be printed in more than one reel, you may want to prepare 26-frame pullups (for 16mm) while splitting tracks, or you may wait until the mix (see When Reels Are Spliced Together, p. 691). At the end of the film, splice on an SMPTE tail leader and put beeps at the tail sync mark on all the sound tracks to be able to check that all the rolls remained in sync throughout the mix. Add about 15 or 20 feet of white leader after the beeps, which is needed so that the dubbers can be run past the end of the film and then back, and properly label the tail leaders.

Preparing the Picture

These days, most mix studios use video projection. If you’ve edited with workprint, it will often be transferred to video for the mix (in fact, the mag tracks will probably also be transferred to a digital format).

Whether you’re doing a video transfer or actually mixing with the workprint, the workprint should be double spliced and run through a synchronizer or projector to check the splices; with guillotine splicers, the sprocket holes are often incompletely punched out. Many filmmakers make a slop print (a workprint of the workprint) to have a splice-free copy for the mix, since every minute of delay in the mix is very costly. Making a slop print also allows the negative cutter to conform the original to the workprint before the mix is complete.

When doing a cue sheet, indicate the location of sounds by footage count. The footage counter should be zeroed at the “Picture Start” frame on the SMPTE leader. You can usually round off the foot/frame measurement to the nearest quarter foot (for example, in 16mm, 10 feet, 22 frames is about 10.59). Some mixers will want the footage indicated in 35mm feet (see p. 598 for conversion from 16mm to 35mm footage counts) or in timecode.
Types of cement splicers range from large foot-operated models to small portable units. Splicers used for acetate-base films use cement to fuse together the overlapping ends of two pieces of film. (For polyester-base films, large, expensive splicers fuse the pieces of film together, generally without the aid of film cement.) Follow the instructions for the particular type of splicer you have and get someone to show you how it works. Before you attempt to splice important material, practice with scrap film until you are proficient. While practicing, test your splices by yanking on them. The film should snap before a well-made splice comes apart. Twisting will make most splices come apart, but will give you a way to compare the comparative strength of test splices.

Hot splicers have a heating element to speed the drying of the film cement, and are faster to use. Since the heating element takes a fair amount of time to warm up, hot splicers are often left plugged in during the whole working day (or, in busy editing rooms, they may never be turned off). However, some editors feel splices made with the heating element on do not last as long. These editors often use hot splicers because of the quality of their construction but use them with the heating element turned off.

The film cement contains a solvent that dissolves film base, and, when dry, will weld together two properly prepared pieces of film. It’s important to use a high-quality fresh cement. When exposed to air, this solvent evaporates, and the film cement becomes gummy and will no longer make a good splice. To keep the cement fresh: Keep a small working supply of cement in a small well-capped glass bottle, and discard the contents every couple of hours. Store the bulk supply (which generally need be no more than a pint bottle) separately.

Keep the splicer clean of emulsion, properly adjusted and the scraper sharp. Acetone will dissolve both emulsion and film cement. You can use it to clean both the splicer and the small bottle that holds the film cement.

To splice: Place the film in the splicer, emulsion side up. Use the scraper to remove completely the emulsion and binder from the section of film to be overlapped (see Figs. A and B). Make sure the scraped area is clean and dry before applying the film cement. On some splicers you must moisten the emulsion with water or saliva before scraping, and on others you can dry-scrape. You must also remove magnetic striping (if any) in the area to be spliced, either by scraping or by dissolving it with
film cement and wiping it away. When scraping emulsion you must be careful not to scrape too deep and gouge the exposed base (see Fig. E).

Any wax or dirt on the base of the overlapping piece of film (that is, the film to be spliced to the area where the emulsion has been scraped) may interfere with a good weld. To remove any foreign material, wipe with an alcohol-moistened cloth or apply a small amount of film cement and immediately wipe it off with a soft cloth. Some editors also lightly scrape the base on the overlapping piece of film. Again, be careful not to scrape too deeply. Apply the cement to the area where the emulsion has been scraped in a thin, even layer. Immediately press the base of the overlapping section onto the scraped, cement-coated area. Open the splicer, and wipe off any excess cement. Rub the splice firmly with a soft cloth to give added assurance of a good splice. Check that the splice is transparent; hazy areas or bubbles are signs of a poor splice.

A properly made splice can be removed from the splicer after ten to thirty seconds (depending on the type of film cement). A hot splicer cuts the time down to five to ten seconds. Though the film can be projected immediately, the splice cures and becomes stronger over time (two or more hours). Causes of poor splices include: emulsion or binder not completely removed; excessive scraping weakening the base, causing the film to break; too great a delay in joining the sections of film after applying cement; too much cement, making a messy splice and also possibly causing the film to buckle in the projector gate; too little cement, making the weld too weak; wax or oil not removed from the base of the overlapping film; old or unsuitable film cement.

**Fig. A.** If a small section of motion picture film were to be magnified to a great size, you would see the film is made up of more than one layer. In this illustration, the thickness of the various layers is exaggerated.

**Fig. B.** It is impossible to cement the base side of one piece of film to the emulsion of another. The emulsion and binder must first be completely removed so that the two film base surfaces can come in direct contact with each other.

**Fig. C.** A good motion picture film splice is actually a weld. When a perfect splice is made, one side of the film base is dissolved into the base of the other film. With most splicing apparatus, this requires from ten to twenty seconds.
Fig. D. If any emulsion or binder remains on the base in the area where the splice is to be made, a good weld will not result and the splice may not hold.

Fig. E. Scratching or gouging the prepared film base near the emulsion edge should be avoided. Such scratches (A) weaken the weld and may cause the film to break at this point. Fine abrasive scratches are not serious.
This is about preparing film negative (or reversal original) for printing. See Chapters 15 and 17 before reading this section. When you have finished cutting workprint, it should be marked in preparation for cutting the original (see p. 603). The following discussion assumes that the negative is loaded on the editing bench on the left side so that forward movement is from left to right.

The work space should be clean and dust-free. Handle the original only with white editing gloves, which are available at most labs. The cement splicer should be properly aligned and used only with fresh cement (see Appendix I for more on splicing). Never mark the original with a grease pencil; use only India ink or scribe marks (see below). Any black leader used should be fresh and completely opaque. The cans in which the original is stored should be marked with the key numbers (latent edge number) so that any shot can be located by number. It’s extremely helpful to have two sets of rewinds. One pair can be used for searching for shots, while the other is used for splicing and, with the aid of a synchronizer, for matching workprint with the original.

Some conformers (also called negative cutters) work by first logging the edge numbers of each shot in the workprint and then pulling all the shots from a given roll of original at one time. This cuts down on the handling of the original, since each roll does not need to be rewound every time a shot is taken from it. The shots are then put aside (see below) and assembled in proper order when all the shots have been pulled. Other conformers work by pulling each shot from the original in the order it appears in the workprint. This involves more handling of the original rolls but may reduce confusion. Most conformers find it simpler to first cut all the shots out of the original and then cement splice them rather than trying to do both tasks at the same time.

Place the edited workprint in the front gang of the synchronizer and wind down to the first shot you want to conform until you find the first key number. Lock the shot in place by pushing the lever on the front of the synchronizer. Locate the corresponding shot in the original by its key number and place it in the second gang of the synchronizer in precise frame-to-frame alignment with the workprint.

Unlock the synchronizer and run the two pieces of film back to the head of the shot in the workprint. Mark the frame where the original is to be spliced with scribe marks—two small scratches made outside the picture area on either side of the
sprocket hole where the splice is to be made. Roll both pieces of film to the right slightly until the scribe marks are to the right of the synchronizer. Cut the original with scissors at least a half frame beyond the frame you just marked (which is to the right on most editing setups). This half frame is needed to make the cement splice. Some people routinely leave a frame and a half extra, which is fine as long as the frames aren't needed for another shot.

Now wind down the workprint and original to the tail of the first workprint shot and scribe the original at the last sprocket hole of the shot. Roll the footage slightly to the left of the synchronizer and again cut the original a half frame longer than the workprint shot.

Some conformers wind up each shot separately (either on a core or around itself) and wrap the last few winds in a piece of paper that identifies the shot by its key number. Sometimes white leader is attached with a very small piece of tape to the head and tail of each shot to protect it. The other widely practiced technique is to tape the shots in a continuous strand on a reel. This is feasible only if the shots have been culled in the order they appear on the workprint. Some people feel this is a poor practice, since tape can damage the original and the gum may be hard to remove. Only low-tack masking tape should be used on the original.

When cutting any shots to be used in a dissolve (which is possible only with A&B rolls unless you plan to use an optical printer), don’t forget to cut at the end of the dissolve mark on the workprint; that is, the shot should be cut one-half the length of the dissolve longer than where the splice occurs in the workprint (the splice is at the center of the dissolve). On the original, sometimes a small x is marked on either side of the sprocket hole at the center of the dissolve (see Fig. 17-5). This should be done outside the picture area on both the A- and the B-rolls, as this helps in aligning the rolls later.

When preparing A&B rolls, it’s advisable to have a synchronizer with at least three gangs. Begin by preparing the printing leaders as described in Chapter 17 (see Fig. 17-8). Line up the printer start marks in the synchronizer. The SMPTE leader is usually spliced on the head of the B-roll immediately following the white printing leader. Black leader is spliced opposite it on the A-roll and trimmed to the same length (run both strands in the synchronizer to measure where to cut). The first shot of the cut original film is then placed on the A-roll, with black leader spliced on the B-roll opposite it, and so on.

Remember that fades are laid out differently for reversal films than they are for negative films, while dissolves are laid out the same for each (see Chapter 17). It is imperative that the emulsion of the black leader never be scraped during splicing, as this will defeat the purpose of checkerboard printing—invisible splices. Scrape only the original film on the overlap you left when trimming each shot. The workprint should be run in the third gang of the synchronizer so you can constantly check that you’ve correctly positioned shots and effects on the A&B rolls. After the rolls are spliced, they should once again be checked against the workprint for cutting errors. Don’t forget to do a cue sheet to instruct the lab concerning fades and dissolves (see p. 673).

See Cinematography by Kris Malkiewicz (in Bibliography) for a more detailed description, with illustrations of how to conform original.