

CHAPTER 15

Syncing the Music to Picture

Scoring sessions are the greatest thing in making movies because the film is ... cut by then.... It's the first time you can sit back and watch the picture come together.'

—Stuart Baird

Like many technologies in today's modern digital world, the methods available to a composer for synchronizing music to picture are expanding. Traditionally, the composer waited to receive timing notes from the music editor before beginning to write individual cues. However, with today's computer technology, it is possible to score an entire film without ever creating any timing notes, and still sync the music to the picture. In fact, this is how many composers work, especially those that write directly into a sequencer. This chapter discusses the various methods of syncing, beginning with the traditional way of using timing notes. First it is necessary to understand some basic mathematical ratios and terminology of film and music:

Frame

A film is actually a strip of thousands of photographs passing through a lens, giving the illusion of movement. Each of these individual "photos" is called a frame.

24 frames per second

The speed that 16- and 35-millimeter film (most feature films) run through the projector.

30 frames per second

The speed that something originally shot in video will run through the VCR (in the United States).

Two to four frames

The amount of error that the human eye can see if the music is out of sync. Remember those old black and white “B” movies where the actors’ mouths and the actual words are out of sync? This could be a differential of as little as two frames for the viewer to discern the difference. Converted to seconds, two frames equals $\frac{1}{12}$ or .08 seconds. In terms of time, that is a tiny fraction of a second. But the eye, ear, and brain are fast and can pick up that small of a difference.

Sync point

A place in the action that a composer wants to accent. This can be the end of a line of dialogue, a cut from scene to scene, or a piece of physical action like a fight, a chase, or a kiss. (A sync point is also called a hit, the place where the music “hits” a certain piece of action or a cut.)

No matter which synchronization method is used, the first thing for a composer to do is view the cue several times. The most important thing at this point is to *get a feel for the tempo of the cue*. Often, the on-screen drama suggests certain rhythms, and the way the different shots have been edited together suggests a certain pacing. Sometimes the music goes against action on-screen. For example, there could be a chase scene where the music moves very slowly for a dramatic reason. Whatever the conclusion, the tempo of the music must be established before writing can begin.

Once an approximate tempo is reached, the composer decides where there should be sync points, if any. Reference to the spotting notes and any decisions or requests from the director are noted, and the composer arrives at a general musical concept for the cue. Some cues have no sync points, and the music just “washes” through the action, creating an overall mood or feel. Others, especially action cues, can have many sync points. When the music mimics the action exactly, it is called *mickey-mousing*, coming from the old cartoons when the music followed the action almost beat by beat (this term is used whether it happens in cartoons or not).

The timing of sync points can also be determined from the *window burn*—a rectangular box on the screen of the work print that shows the reel, minutes, seconds, and either hundredths of a second or frame numbers. This is actually a visual representation of the SMPTE time code used to lock up the video equipment to the audio.



Fig. 15.1. Window Burn.

Once the composer determines the sync points, he figures out how to tailor the music so that these sync points come at logical places in the music, often at downbeats.

Then the composer decides which method of synchronization to use—click track, clock, or punches and streamers. If a cue has a lot of sync points, or if the music is fast and rhythmically difficult, then a click track would be appropriate. If the music calls for rubato and

expressive passages, then punches and streamers or clock allow that kind of interpretation. If the cue is short, or if there are no sync points that need accurate timing, then the clock would be appropriate.

Punches And Streamers

In the early days of sound films, it was apparent that a technique needed to be developed where the composer/conductor could manipulate the music to synchronize exactly with the film. The first method that was developed was that of *punches and streamers*. It was realized that once the composer decided the exact timing of where he wanted a musical hit, at the recording session that exact frame could be anticipated and the music synchronized to it. The way this worked was that the music editor would literally punch a hole in that particular frame (of the work print, not the negative) so that when the film passed through the projector, that frame would come out as a flash of light instead of a visual image. But that flash, or punch, needed to have a preparation. So a system was developed where the music editor would literally scrape a line (a streamer) on the film for a certain length, usually 3, 4, or 5 feet, which equals 2, 2½, and 3½ seconds. The conductor would then see a vertical line move across the screen from right to left, ending in a flash of light at the exact frame with which the music should synchronize. (See Fig. 15.2. Punches and Streamers.)

When using punches and streamers, there are often *reference punches*, also known as *flutter punches*. These are punches that show the conductor if he is going too fast or too slow. They are often placed at every bar, or every other bar, as tempo guideposts. Before computers, a music editor would find the frame of film in which a composer wanted to see a flutter punch, and punch a hole in every other frame of a five-frame sequence. The appearance on the screen when these five frames go through the projector is of a “flutter” of light. These reference punches are not meant to be hard and fast sync points; they are simply guideposts telling the conductor to speed up or slow down a bit.

Today, the music editor no longer has to manually punch holes and prepare the actual film; punches and streamers are generated by computer programs such as *Auricle*. This is a great advantage, for in the old

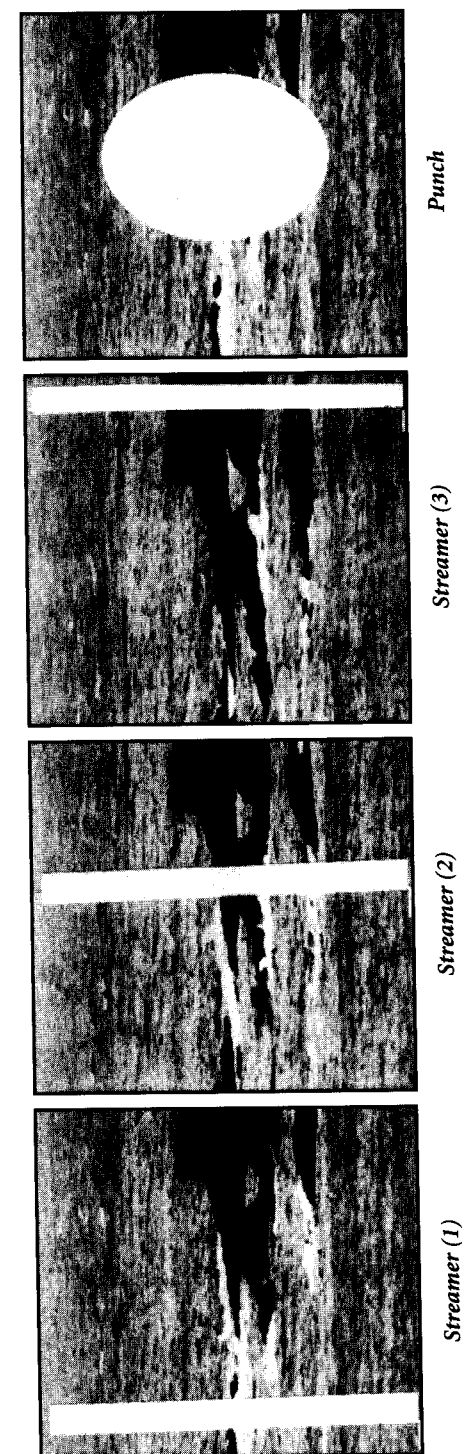


Fig. 15.2. Punches and Streamers.

days, if a change in the music was requested after the punches and streamers were prepared, it could not be done right away, on the spot. The composer and music editor would have to redo the cue, often that night, and record it at another session. With a computer generating punches and streamers, it is possible to make extensive changes on the spot, as long as the composer is able to shift things musically and the music editor is skilled at programming the software.

Using punches and streamers is actually a very accurate method of synchronization, if the conductor is skilled. The advantages of conducting to punches and streamers are that the music can be very flexible and expressive because it is not locked to a metronome, or click track. Also, the conductor sees the film, so he can react to it. The disadvantages are that the technology is not always available, and that if there are a lot of sync points, if the music is fast and difficult rhythmically, or if there are many tempo changes, punches and streamers do not serve the music well.

Click Track

A *click track* provides the tempo the conductor and musicians hear during a recording. Whereas metronome markings are measured in *beats per minute* (BPM), traditionally, film click tracks have been measured in *frames per beat* (FPB). This enables precise synchronization of the music to the film.

Today, computers enable click tracks to be generated in either format, but for many years composers indicated click tempos in their score, marked as pairs of numbers: 24-0, 12-7, 18-3. This has its origins from the early days of film, before the age of computers, when music editors created click tracks by punching holes in loops of film. The hole would pass over the projector's optical sound head and cause a pop, or "click," at a regular interval determined by the length of the loop.

The two numbers represent how many frames, and divisions of the frame, at which the hole would be punched. Since film runs at 24 frames per second, 24-0 FPB indicates a tempo of one beat every 24 frames (one hole punched every 24 frames), or one beat per second

(corresponding to a traditional metronome marking of $mm=60$ BPM). Lower numbers indicate faster tempos. The indication 12-0 FPB means two beats per second, or $mm=120$. The loop of film was shorter and the punched holes moved through the projector with greater frequency, causing a faster click.

The second click-track number is a very small measurement. Composers and music editors realized early on that smaller increments than one whole frame were necessary, so they used the film's sprocket holes as guides for smaller subdivisions. There are four sprocket holes in each frame of film (see Fig. 10.1.), and a hole could be punched at one of these holes or in between them. This gave eight possible increments of click track tempo for each frame. If a composer wanted a tempo slightly faster than 60 beats per minute, instead of punching a hole every 24 frames for a 24-0 click, he might try 23-7, 23-6, or 23-5.

The human ear can't distinguish measurements that small, and short cues of just a few seconds don't require such precision. However, on cues lasting several minutes, these fractions add up, and the difference can mean hitting or missing an action on-screen at the end of the cue.

There are several mathematical formulas that can be used for finding a click tempo in frames per beat; these were used in the early days of film. Also, *click track books* list the timing on every beat at dozens of possible tempos.

In the 1950s a device called the Urei Digital Metronome was developed. This electronic metronome ended the need for film loops running through a synchronized projector, for it could generate any FPB click tempo electronically with the simple turn of a dial.

Nowadays, computers and sequencers are also used to find and generate click tracks. These easily express tempo markings in FPB and in BPM, which are now also divisible into tiny increments.

A click track is best used when the tempo is constant, when it is very fast, when the music is rhythmically complex, or when there are many sync points to catch. Some cues require a *variable click track*. This is

the same as a regular click track, only there are one or more tempo changes. These tempo changes can begin immediately at a new bar line, or can be prepared with warning clicks if the musicians are holding a long note or fermata. There can also be “ramps,” or gradual *accelerandos* or *ritardandos* in the music. Some composers use very slight variations of click from measure to measure in order to make it sound more “real” and less mechanical. At the recording session, the music editor will have programmed the computer with the proper tempo changes, and monitors this process to ensure that the synchronization is accurate.

Clock

Another method of syncing music to film is the use of a *stopclock*, now simply called a *clock*. In this case, the conductor watches a large analog clock with a sweep hand (basically a large stopwatch about 12 inches in diameter). Using the clock method gives some flexibility in the music, but realistically, it is accurate for sync points only to plus or minus a third of a second. When using the clock, the music editor’s job is fairly easy; he just has to know where the music is beginning and ending, and make sure that the conductor is accurate.

Wild

There is one final way of recording a cue, and that is called recording *wild*. This is not when all the musicians go to the studio commissary and party down; it refers to recording without any kind of synchronization reference. A cue is recorded without clicks, punches and streamers, or the use of a clock. The music editor is then responsible for seeing that it is cut into the film at the proper point. This method is often used for very short cues, or cues where changes have been made at the recording studio and the previously prepared synchronization method is no longer valid. If the cue is longer than a few seconds, its success will depend on the skills of the conductor.

There are distinct advantages and disadvantages to each synchronization method:

Punches and streamers are great if the music needs to be free, flexible, or rubato. They are fun to conduct to! They can make your sync points accurate to the desired frame. They can facilitate tempo changes and be effective in any music where there are a lot of holds or fermatas. The disadvantages are they are difficult to use if the music is very fast, rhythmically complex, or has a lot of sync points. The effectiveness of punches and streamers depends on the ability of the conductor. Computers with software that can generate punches and streamers are not available in some studios.

Click tracks are great if you have a lot of sync points or if your music is fast or rhythmically difficult. They can give you spot-on accuracy in making sync points and can assist the players in staying together when there are difficult rhythmic patterns. A variable click track can give very secure tempo changes. The disadvantage to clicks is that they become robotic with a stiff and unmusical pulse. One way around this stiffness is for the studio to send the click into the headphones of the conductor, but not the musicians. This can improve the feel a bit.

Recording to clock is good for having flexibility in the music. It is a desirable method when punches and streamers are not available. It is good for shorter cues that don’t require a lot of drama, like going to commercial in a TV show. The disadvantage is that using the clock is the least accurate of all the methods, so if you have any sync points that need to be dead-on, this method is not preferred. Using the clock is accurate to about one third of a second, or eight frames. Remember the rule of thumb that the human eye/ear connection can determine a differential of two to four frames.

Sequencing

Many composers do not use timing notes in the traditional way; they prefer to just play along with the video on a keyboard until they get an idea that they like. Sometimes they establish a specific click in advance because they know where they want to hit the action. But more often than not, they play without a tempo reference and sequence their ideas. If the sequence is going to be orchestrated and eventually recorded live, it then can fall to a music editor, or a composer’s assis-

tant, to construct a click track for the musicians to play along to at the recording session. This can be painstaking, and often results in the use of a variable click because of the natural variations of tempo that occur during live playing of the sequence. Most good sequencing programs allow the composers to “tweak” a sequence and move the tempo around; if the composer is a few frames early or late on a specific hit, that moment can be moved to be more exact. However, if a click is used while the composer is sequencing, that is easiest for the music editor, for it keeps the composer’s tempo “honest.”

Note that if a sequence is the final music for the project, then all of this is fairly straight-forward. All you must do is correctly edit and align the sequence to the places you want to hit. But if you are using the sequence as a mock-up of the cue, as a sketch, or as a way of generating some initial ideas, and the sequence is going to be orchestrated and then played live, then the process can be complicated. It may require a team of people: music editor, MIDI transcriber, and orchestrator.

Music editor Eric Reasoner describes working with composers who sequence, as well as those who use timing notes to prepare their score:

There are a couple different modes of working. Some composers play stuff into a keyboard and sequencer while locked to picture. That’s one mode of working, and that MIDI file then has to be deciphered. A click has to be laid up against what was played if the composer wasn’t listening to a click, which happens a lot of times. They just play to picture, and then you have to figure out a click track so that they hit particular musical events where they want to on the picture.

The other way is where the composer takes the timing notes that you’ve provided for them and utilizes that information. They do the math, they figure out how many bars, beats, and clicks. They figure out tempos, and lay out their score based upon that information. Then I see the score later and basically line it up with the picture. “Lining it up” means I create the click track and the

streamers and punches after the score is written, according to what timings I see above what measures, and what instructions are given. And that’s relatively simple and fast, because they’ve taken care of it.

Once you choose your method of synchronization, you are ready to set up the score. Whether putting pencil to paper or sequencing, it is a good idea to lay out the entire score, locate all the sync points, and know whether any meters need to be adjusted, before beginning to write.

In beginning this composing process, several things must happen. First, watch the scene many times. Have a strong idea in your mind of what you want to say with the music. Should it be funny or should it heighten tension? Should it be somewhat neutral, or melodramatic? The mood or the emotion you want to express will suggest a tempo. Remember that the composer’s role is to help move the story forward. It is of the utmost importance that you know why the music is in a certain scene, and what it is supposed to accomplish. Then your writing will be focused and appropriate dramatically.