

Worksheet – Digital Video > Understanding Timecodes*

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Due:**Objectives:**

1. To learn counting video time with timecodes.
2. To understand how the drop-frame and non-drop frame timecodes work.
3. To understand what the timecode affects and what properties of the video the timecode does not change.

Introduction:

A timecode defines how the frames in a video are counted in terms of hours, minutes, and seconds. There are two types of timecode: drop-frame and non-drop-frame. See *Adobe Premiere Classroom in a Book* for more information.

For example, the following indicates video time at 0 hours, 2 minutes, 51 seconds, and 20 frames.

drop-frame timecode 00;02;51;20

non-drop-frame timecode 00:02:51:20

Exercise:

The minimum number of each segment in the timecode is zero.

What about the maximum? Indicate the maximum number for each segment in the timecode:

00;00;00;00

00:00:00:00

Max. Possible Number →

Notice that the drop-frame timecode uses semicolons while the non-drop-frame timecode uses colons. This is how you can tell which timecode a system is using.

What is the difference between drop-frame and non-drop-frame timecodes? Why are there two timecodes? How do you choose which one to use? Does drop-frame mean deleting frames from the video?

Before going into a discussion of different timecodes, let's look at an analogous situation in our daily life—leap years. The time it takes for Earth to orbit the sun is about 365.242199 days (according to Encyclopedia Britannica). Because it is not an exact number of days, we need leap years. How? 365 days are designated for a year because the number 365.242199 is closer to 365 than 356. However, this causes an inevitable slight shift of days—about 0.24 day a year, about 24 days for every 100 years. Without leap years, the seasons would shift. By adding one extra day to every fourth year, getting an average of 365.25 days per year, we offset the shift very closely. Why do we need leap years? —Because we want to keep the seasons the same at the same time of the year every year. Do we skip or delete time from our lives by using leap years? —No, of course not. We have the same

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amount of time no matter whether we have leap years or not; it is just a different way of counting days.

A similar situation arises with the NTSC-standard timebase. The NTSC-standard timebase is 29.97, not exactly 30 frames per second (fps). Such fractional discrepancy will accumulate to make a significant difference between the actual frame duration and the time duration. Using drop-frame timecodes eliminate this error.

When you use a drop-frame timecode, the program renumbers the first two frames of every minute except for every tenth minute. It sounds complicated at first, but let's do a calculation below and you will understand the rationale behind it, and it will not seem complicated anymore.

Exercise – From timecode to frames.

- 1. How many frames are there in an exactly 1-min video?
If the timebase of your video is 30 fps:

If the timebase of your video is 29.97 fps:**
- 2. For a 1-min video clip, what is the frame difference between the 30 fps and 29.97 fps?**

From the above exercise, you see the frame difference between 30 fps and 29.97 fps in a 1-min clip is approximately 2 frames. Now you see why the first two frames of every minute need to be renumbered in the drop-frame timecode for NTSC-standard timebase.

Question: Now, why does such renumbering skip "every 10th minute"?

Exercise - From frames to timecodes:

Determine the timecode for the 1799th frame and 1800th frame. Show your calculation for each timecode. Remember, 30 fps. An example calculation is given for calculating drop-frame timecode for the 1800th frame.

**Non-drop-frame timecode for:
1799th frame**

1800th frame

**Drop-frame timecode for:
1799th frame**

1800th frame

Example calculation:

1800 frames/30 frames per second = 60 seconds and 0 frames
= 1 min, 0 sec, and 0 frames

Considering the rule for counting time with drop-frame timecode,
drop-frame timecode is 00;01;00;02

Conclusions & Review Questions:

Which timecode uses colons, and which uses semi-colons?

Does drop-frame or non-drop-frame timecode cause loss of frames in a video clip?

If you switch from drop-frame to non-drop-frame timecode, or vice versa, will any frames be removed from a video clip?

Which timecode, drop-frame or non-drop-frame, is preferable for the NTSC 29.97 fps?