

# EDITORIAL: HIGH FRAME RATE (HFR) MOVIES AND THE CHOICE OF FRAMES PER SECOND

FROM THE TOP

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High Frame Rate (HFR) seems to be the new buzzword in movie production, these days, at least to some directors who are experimenting with it. For example, *The Hobbit* was shot at 48 FPS (Frames per Second), with a 4K digital video camera. The idea is that HFR makes motion much smoother. And it works. But, do we, as viewers, then feel that we are actually in the scene, as opposed to being in the audience? One industry professional who is working with 4K and 3D said he hated the 48 FPS. It takes away the “film look” that so many people like, and turns the motion picture into something that

has the “Soap Opera Effect”, namely, live TV. But, notwithstanding the visual effect, let’s focus on the choice of 48 FPS and why this is a potential disaster.

First, why was 48 FPS used for *The Hobbit*? For the first century of movies, 24 FPS was used, and they were shot on 35mm film (exceptions are movies shot on 70mm film such as *Ben Hur*, and at 30 FPS such as *Around the World in 80 Days*). So, I guess, it seemed logical that for an HFR movie, why not just double the normal frame rate to 48 FPS? And that is what they did.

However, 24 FPS was not chosen for scientific reasons when movies started being filmed with motorized movie cameras. It was chosen as the best compromise between the cost of the film stock and seeing smooth motion in the image. There are no laws of physics surrounding this choice; it is not a magic or absolutely necessary number. Unfortunately, we have been paying a heavy price for that choice ever since movies started to be shown on TV, because TV works at 60 fields (30 frames) per second in the US and 50 fields (25 frames) per second in Europe. Neither is divisible by an integer to produce the number 24. So, to view 24 FPS movies on TV, electronic manipulation is required to end up with 24 frames of movie film to be spread out over a 1 second period, by showing certain frames twice. This produces “judder” in the image, and to this day, in spite of the excellence of digital video cameras, automobile commercials are shot on film, and the commercial tries to sell you a \$50,000 car, viewing it with judder several times each second while it is supposed to be gliding down a mountain road. What are the PR firms thinking? Use a digital video camera at 1080 60i you dolts ! !

If directors want to use HFR in their digitally shot movies, they should use either 30 FPS or 60 FPS, definitely not 48 FPS. That way, no “pull-down” electronic manipulation is required, and the movie could be seen in its native form, without judder. To take it a step further, if it is shot at 60 FPS, the player could have a feature that shows every other frame, so you see it at 30 FPS which would give you that “film look” that you are used to, or at 60 FPS, if you like the “live TV” effect. Also, there will be a requirement to break up the image into 1080 60i, as Blu-ray discs currently don’t support storage in 60p format. The TV converts it to 60p by generating the second field.

European TV has 50 fields (25 frames) per second electronics. However, most displays now run at both 60 Hz and 50 Hz. If they don’t have a 24p mode (like the 96 Hz mode on a Panasonic plasma, or 120 Hz on an LCD), then they run at 60 Hz using 3:2 pulldown like in the USA. If they get a 50 Hz signal (like SD or HDTV), then they run at 50 Hz.

In any case, I write this editorial in hopes of nipping a big potential issue in the bud. Please shoot your \$300 million summer blockbuster 4K digital movie at a frame rate that is divisible by an integer to produce the number 30 or 60. This will simplify the electronics of players and HDTVs, and make us consumers all very happy.

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Editor