

CINEMA MIXING LEVELS SURVEY

A first step on the way to playing it at 7 again.

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1 - Introduction

Why I feel concerned about the issue of Cinema playback levels

I have been working in sound for film for around 23 years, and in that time dynamics have gradually disappeared and good practices have all but dissolved in what used to be a standard-driven industry. The catch-all phrase “*Dolby was here just last week*” - which used to mean that the theater you were in was grossly misaligned - is not even used anymore as the advent of Digital Cinema has in some cases turned theatre installation and tuning into a last-minute rushed job that is rarely re-visited.

For years, Re-recording (or Dubbing) Mixers had to contend with pre-show content being mixed very loud (commercials and trailers with a max loudness of 85 Leq, usually mixed up to 8 or 9 dB hotter than the movie), which forced projectionists to turn the B chain level down, sometimes not to be turned back up again.

Today, playback levels from DCP servers can be programmed, but the levels often stay well below the once-standard Dolby Level 7 because the actual movies are often mixed too loud, and cinemas prefer to play at lower levels rather than risk being on the receiving end of a complaint. A knee-jerk reflex emerged over time: to mix louder to counter the fact that the cinema might lower the playback level. This led in turn to more complaints and more projectionists lowering the level further. And so Producers/Directors/Mixers feel the need to mix even louder...

This never ending cycle is causing havoc in film sound all over the world. People used to accuse most US-mixed blockbusters of being the loudest films of all, before starting to mix at lower monitor levels themselves and pushing out very loud mixes with reduced dynamic ranges. In a [2013 AES paper](#), Eelco Grimm did a very good job of explaining what was happening to loudness in cinemas.

I happen to be passionate about my job, like many people in this business. I do not want to go with the flow, and let cinema-goers end up watching movies mixed so loud that they have the dynamics of an internet podcast played back at 2 on the Cinema Processor. I believe that filmmakers have a responsibility toward their ticket-paying audience to show them a movie made with an attention to detail, dialogue intelligibility, overall levels and dynamics, and that those same filmmakers need to be able to be trusted again by Cinema owners to deliver content that adheres to a common playback standard.

I fear that if we do not act all together, Cinema mix levels will soon be subjected to stringent Laws and Rules that will be totally contrary to artistic freedom that one has when mixing for film.

The survey got 387 responses, from all over the world, and from Mixers working on all sorts of movies (from ultra low budget to Hollywood blockbusters). The survey was voluntarily anonymous, so that responders would not feel inhibited in their answers by having their name tied to their monitoring level.

So why not all try to mix responsibly, at 7...

2 - Reminder of the Dolby Processor fader level vs dB SPL playback level

For years the fader on the Dolby box in projection booths around the world has given us a rough idea of the actual playback level in the cinema. Even though some recent boxes (ie. Datasat AP20) no longer exactly follow the attenuation curve of a Dolby, here is a refresher on the Cinema Playback levels for a given Dolby Fader Value:

From the Dolby CP 650 manual:

Main Fader Knob

Use this knob to adjust the sound level. A fader reading of 7.0 is the nominal correct operating level. The main fader knob rotates continuously with no end-stops. The knob is also used for data selection during setup operations.

When the fader knob is rotated between readings 0 and 4.0, the output level changes in 20 dB steps between -90 dB and -10 dB. When the fader knob is rotated between readings 4.0 and 10, the output level changes in 3 1/3 dB steps between -10 dB and +10 dB.

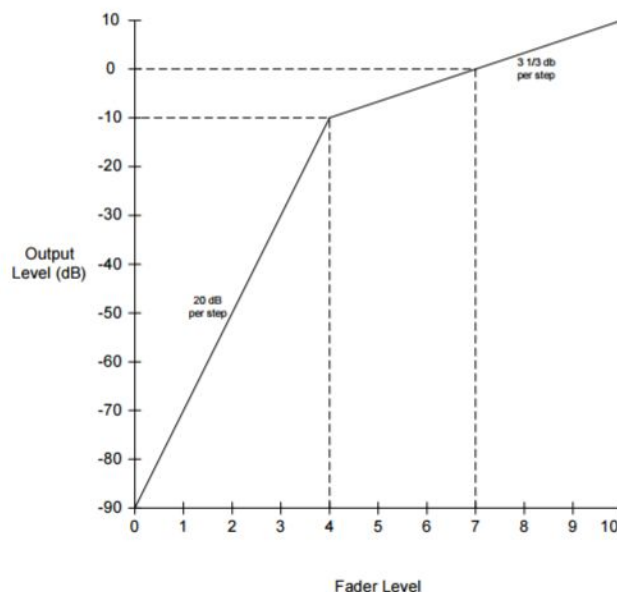


Figure 3-3 Fader Characteristic

And a quick summary of levels from 7 down to 4:

Dolby Fader	Pink noise playback level per screen channel in dB (C)
7	85
6.5	83.33
6	81.66
5.5	80
5	78.33
4.5	76.66
4	75

3 - The Survey questions

There is not much science behind the questions that I put to those who responded to the survey. The questions are based on the points I believe have an impact on the way we mix, and that may be pushing a re-recording mixer to choose a non-standard mix monitoring level.

[The full set of responses can be found here](#) (some responses have been edited to conform to a common set ie. United States has been edited to USA).

Answers can also be viewed and filtered using the Awesome Table widget [here](#).

- **a) What is your MAIN mixing expertise area?**
 - I thought it would be interesting to know if Film Mixing is the main occupation of the Mixers who answered.
- **b) What country do you operate in?**
 - This allows me to do a region by region analysis.
 - Responses cover 52 countries
- **c) How would you describe the budgets of the films you mostly work on?**
 - This question requires an answer on a scale from 1 (very low budget) to 10 (Hollywood blockbuster). I left it as a relative scale, as a US big budget would not be the same as a German one, but what is important is how the Mixers approach mixing levels for different budgets.
- **d) If you work primarily for ONE mixing facility, what is the approximative size of the room?**
 - Some Mixers are tied to certain facilities, or prefer to mix there.
 - Room size is one the first reasons invoked for mixing at different levels.
 - 324 Mixers answered this question
- **e) If you work primarily for ONE mixing facility, what sort of screen channel speakers do they use?**
 - Music Studio Monitors will react very differently to sound vs typical cinema speakers, as will more modern approaches like the Meyer Sound speakers.
 - 359 responses
 - Please note that in some of the graphs there is a reference to soft dome tweeters. This is just an example, as it could also be hard dome. Please consider this as a more general “Music Studio Speaker” category. This was pointed out to me by Philip Newell.

- **f) When mixing feature films for CINEMA (not trailers) , what is the Monitoring level in the mix room during predubs/premixes?**
 - Some Mixers prefer to predub a bit hotter (lower monitoring level) so that the predubs will retain their integrity when mixed with other elements (ie. Music brought in later in the mix)
- **g) When mixing feature films for CINEMA (not trailers), what is the Monitoring level in the mix room during Final Mixes?**
 - This is the level for Final Mixing and Printmastering
- **h) When mixing, do you offset the Monitoring level to compensate for the size of the mix room / mix stage?**
 - Sort of related to question d), but relevant also for freelance Mixers who go to smaller studios to mix.
- **i) When mixing for CINEMA at the level stated above, how loud does your Mix feel to you in the room?**
 - It's important to know if - for a certain monitor level - Mixers feel that they are mixing Loud or Soft
 - OK so this one is on a scale from 1 to 7. Would have been clearer with a 1-10 scale.
- **j) When mixing for CINEMA at the level stated above, have you ever used ear protections while being actively engaged in the mix?**
 - One to get the myths out of the way
- **k) When mixing for CINEMA at the level stated above, have you ever mixed loud scenes with the DIM button enabled?**
 - And another
- **l) How often do you take breaks in a normal work day?**
 - Not directly related to the mix level, but a good indicator of how we take care (or not) of our most precious tools: our ears
- **m) When mixing for CINEMA, do you have an approximative loudness target for dialogue?**
 - This was to see if there was a trend starting about measuring or aiming for a non-broadcast target for dialog, on top of using one's ears of course.
- **n) If the Monitoring is set at a level other than Dolby Fader 7 (85dB), what is the reasoning behind it?**
 - Ready-made answers as well as free ones.
- **o) Do you go to a cinema to watch the movie after release?**
- **p) If yes, how do you rate the sound level of the movie in the cinema compared to the level of the mix stage**

- Two questions out of pure curiosity, as we all know that cinema experiences are as varied as there are cinemas... Until we get that to change ;-)

4 - Response analysis by Region

a - Worldwide Responses

b - USA & Canada

c - France, United Kingdom and Germany

d - Eastern Europe

e - Asia, North Africa and Middle-East

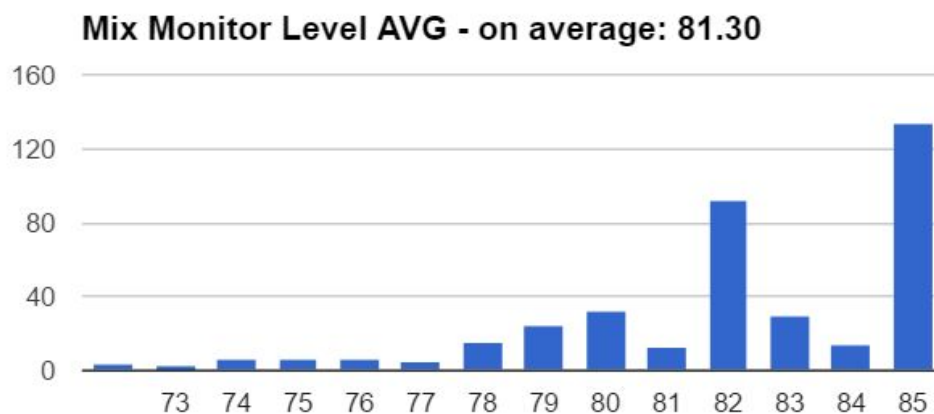
f - South America

a - Worldwide Responses

Number of responses: 387

Average Monitoring level for Final Mixes is 81.3 dB (Dolby Fader 5.8) with a minimum of 73 (3) and a maximum of 85 (134).

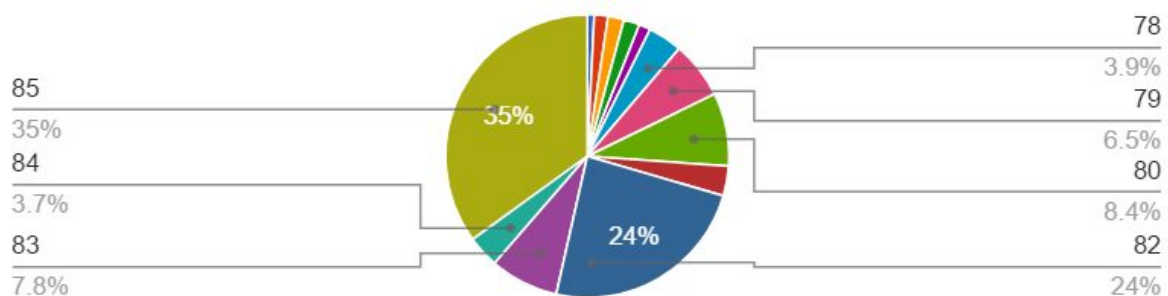
Fig. 1



As you can see in the graph below, 35% of Mixers who responded mix at 85. 82 also seems to be a favourite, with 24% of responses.

Fig. 2

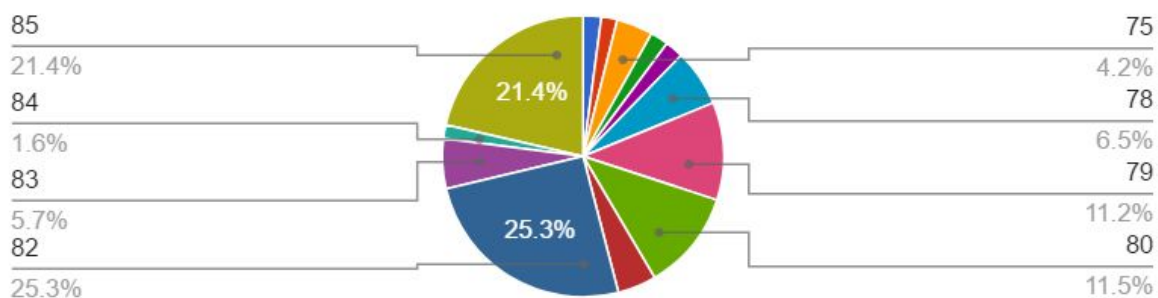
Mix Monitor Level



As expected Predub levels get a slightly lower rating for 85 dB at 21.4%:

Fig. 3

Predub Monitor Level



Country:

Fig. 4

What country do you operate in?	Top results
USA	111
UK	47
FRANCE	30
GERMANY	25
CANADA	15
NETHERLANDS	12
POLAND	9
BELGIUM	8
INDIA	8
ITALY	8
FINLAND	7
ARGENTINA	6
NORWAY	6
AUSTRALIA	5
DENMARK	5

Area of expertise:

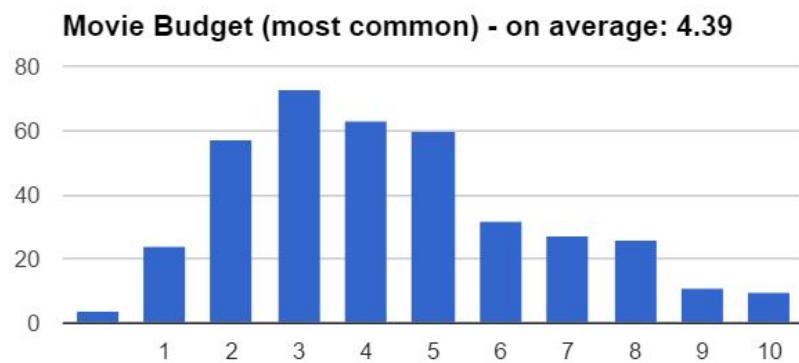
As shown below, 54% of responses were from Mixers who mainly mix feature films, followed by 37% for TV/Broadcast professionals.

Fig. 5

Area of Expertise	Top results
Cinema / Theatrical	211
TV / Broadcast	145
Music	10
Video Games	3
Live Sound	2
50 % tv and 50 % cinema	1
Cinema/Theatrical/TV/Blu Ray	1
Educator	1
Engineering	1
Mixing for Festivals (Indie)	1
Online	1
Radio	1
TV/CINEMA/DOC	1
Vr	1
Web videos	1

Budgets:

Fig. 6



Room size and equipment:

Fig. 7

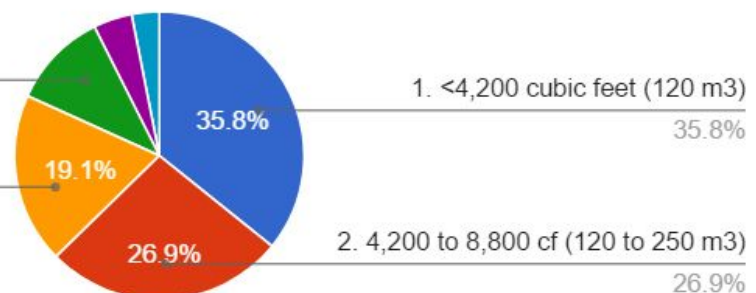
Approximative size of the room?

4. 17,600 to 35,300 cf (500 to 1000 m3)

10.8%

3. 8,800 to 17,600 cf (250 to 500 m3)

19.1%



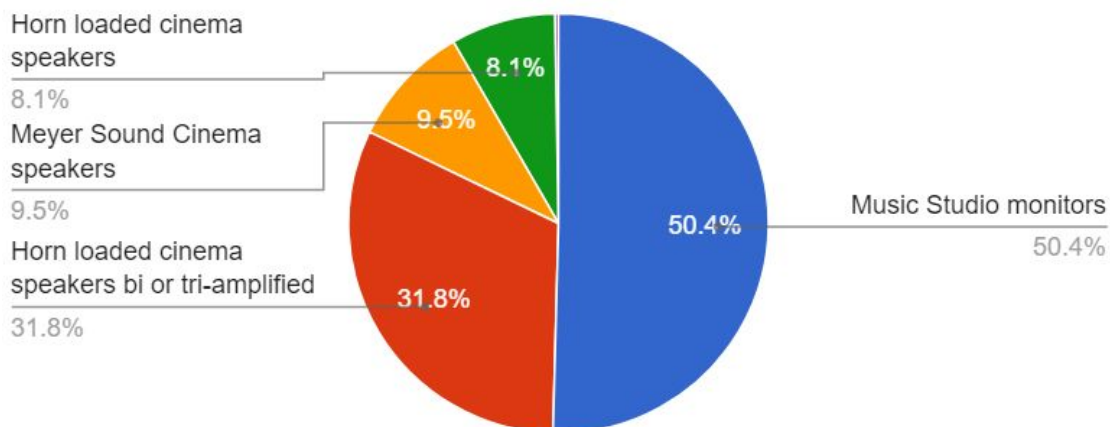
35.8% of responders mix in what could be called a *very small room* when compared to theatrical standards, and 26.9 % in a small mix room (120 to 250 cubic meters, my own room falls into this category, at 200).

The first group would clearly not have been approved by Dolby at the time when Printmastering for 35mm required a Dolby License, and some if not most of the second group would also be in that situation.

One can clearly see that with the advent of Digital Cinema, people are now able (for good or for worse) to mix for Cinema in very small rooms.

Fig. 8

Screen channel speakers



Out of the 359 responses to the screen channel question, over 50% reported using studio monitors. If one looks at the very small room responders, this figure jumps to 81.9%. This is of course natural as cinema speakers tend to be too aggressive in smaller listening environments, but shows that many films are being mixed on systems that bear no resemblance to the equipment used in cinemas.

How loud does the mix feel in the Mix Room vs the (average) cinema?

Fig. 9

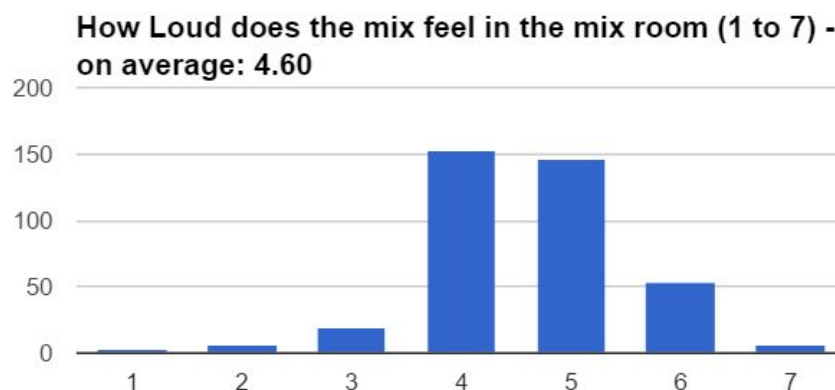
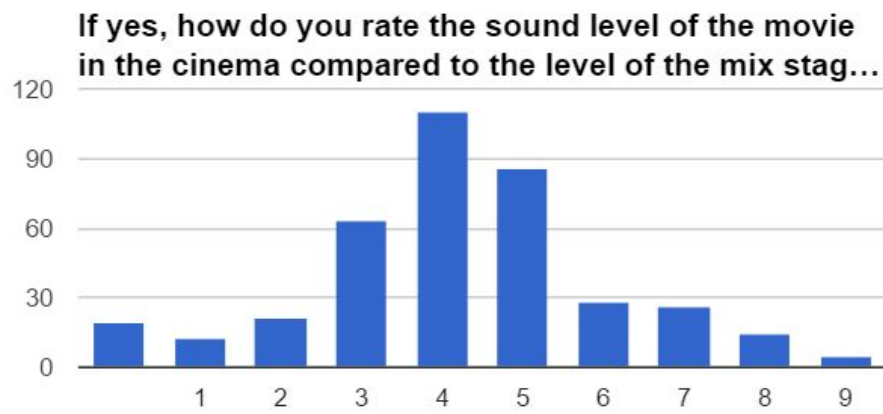


Fig.10



b - US & Canada Responses

Number of responses: 126

48% of responses come from people working mainly in Film, and 41% from Mixers working mainly for TV.

Average Monitoring level for Final Mixes is 82.6 dB (Dolby Fader 6.3) with a minimum of 73 (1) and a maximum of 85 (62).

Fig.11

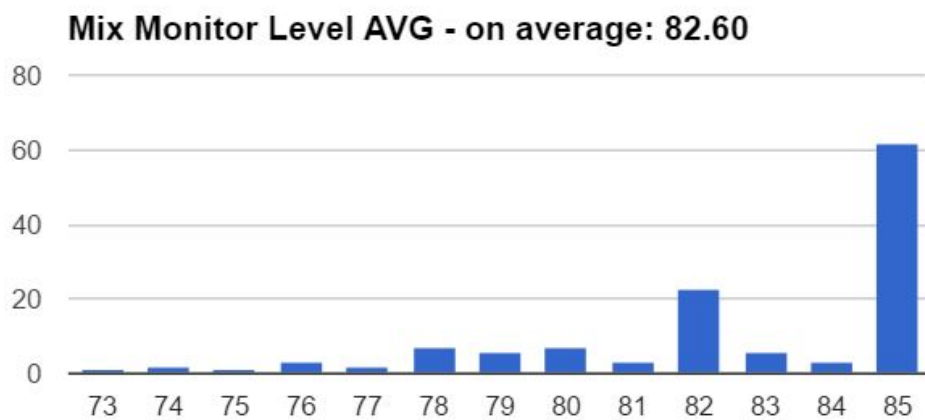


Fig.12

Mix Monitor Level

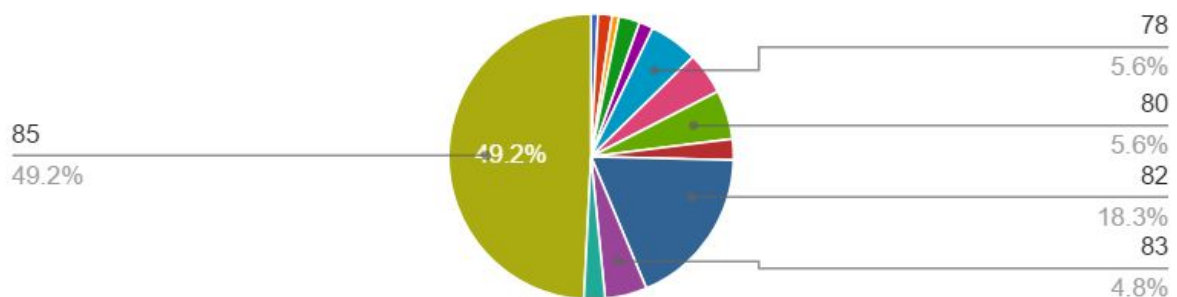


Fig.13

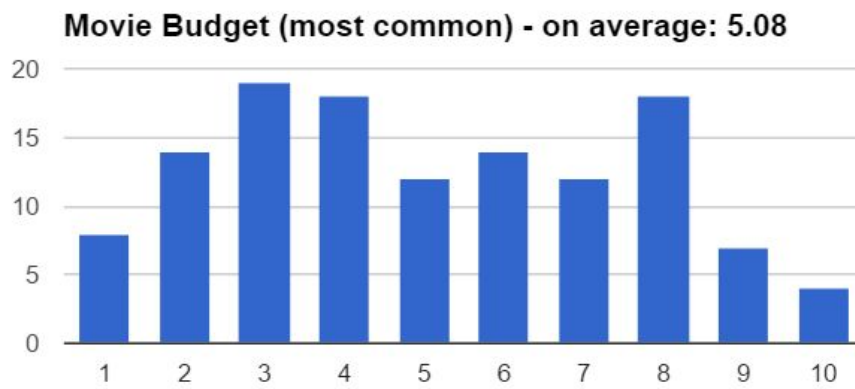


Fig.14

Approximative size of the room?

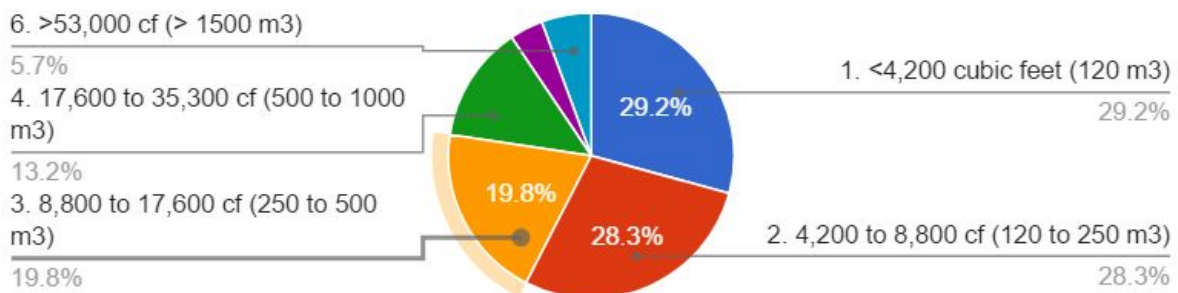
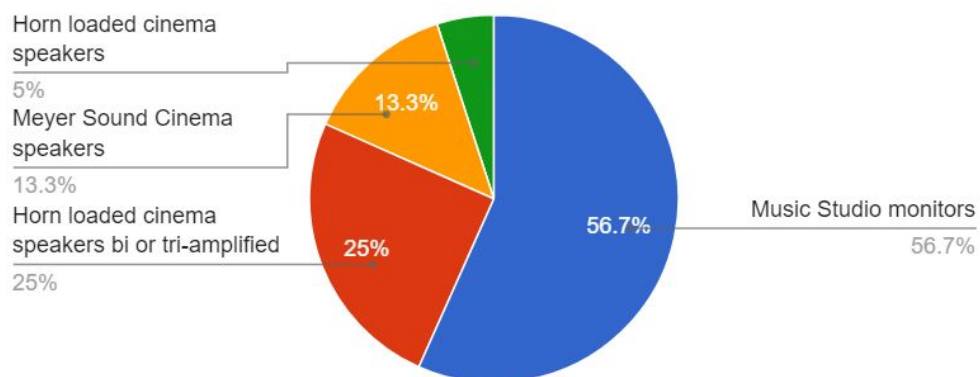


Fig.15

Screen channel speakers

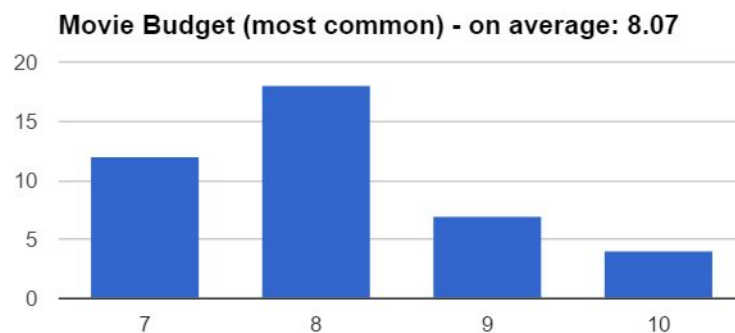


The big budget movie situation:

Having received quite a few responses from Mixers claiming to work mainly on top-tier budget movies, I thought we could take a closer look at those answers.

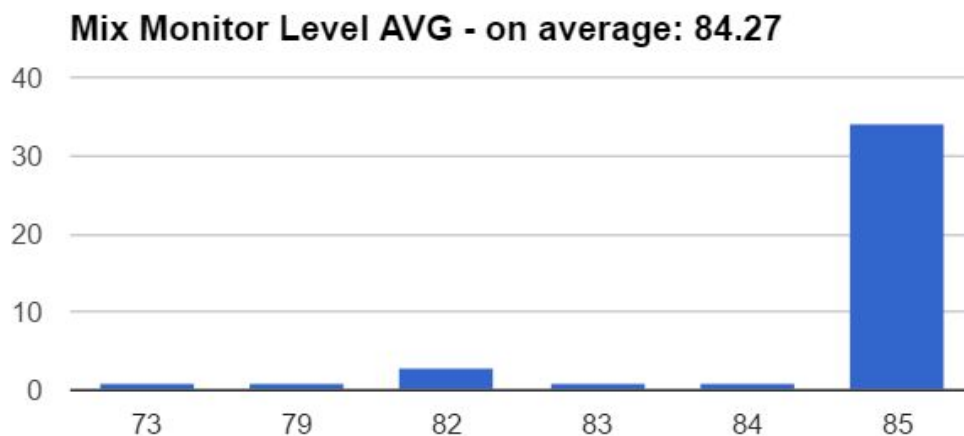
I chose to select budgets 7 to 10 (in our relative scale, 10 is really a blockbuster budget here). The number of responses for the budgets 7 to 10 are respectively 12, 18, 7 and 4.

Fig.15 (filtered)



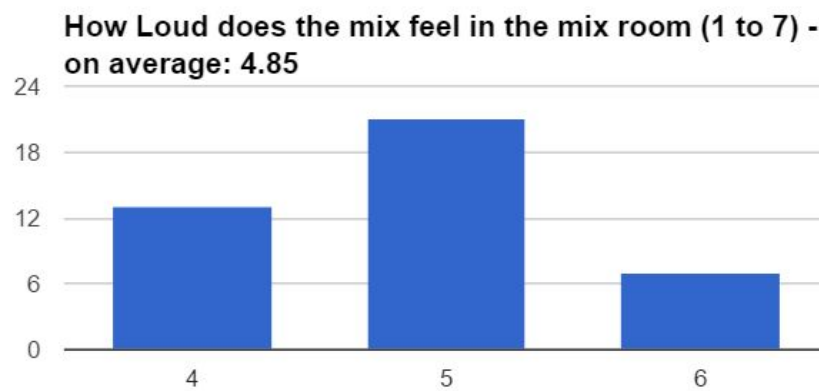
And here is the monitoring level:

Fig.16 (filtered)



It seems that there is one fluke answer (73), but overall the listening level is 85. Now how loud are they actually mixing? With monitors set to 85, things can get a bit loud in the room, so here we go:

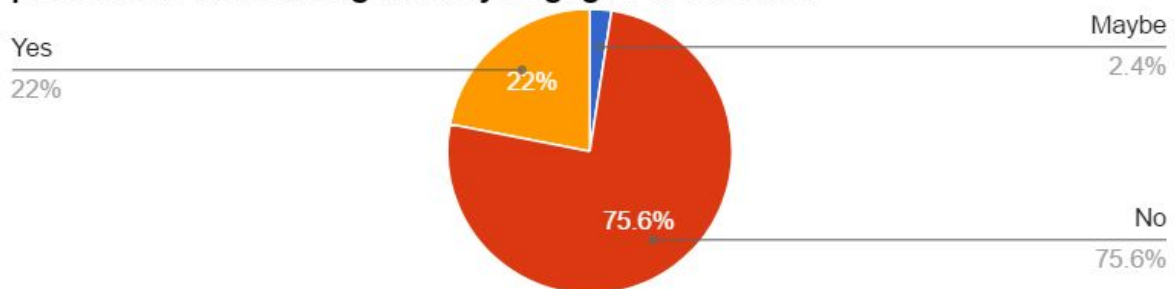
Fig.17



5 out of 7 can be considered loud, and 6 very loud, which probably explains that some of the responders also answered that they have used ear protection when mixing:

Fig.18

When mixing for CINEMA at the level stated above, have you ever used ear protections while being actively engaged in the mix?



The 22% rises to 57% when taking into consideration those who answered 5 or 6 to the in-room loudness question.

To sum things up for the big budget part, I'd say that nearly all Mixers in this category mix at a monitoring level of 85, but some will be mixing hot at this level.

However, and this is my personal opinion, I do not believe that Mixers (even when mixing Hot) can go all day at levels exceeding normal mix levels by more than 3-4dB.

Lower budgets (1 to 3)

The USA also have a thriving indie movie scene, let's take a look at the mixing practices for that budget tier.

Fig. 19

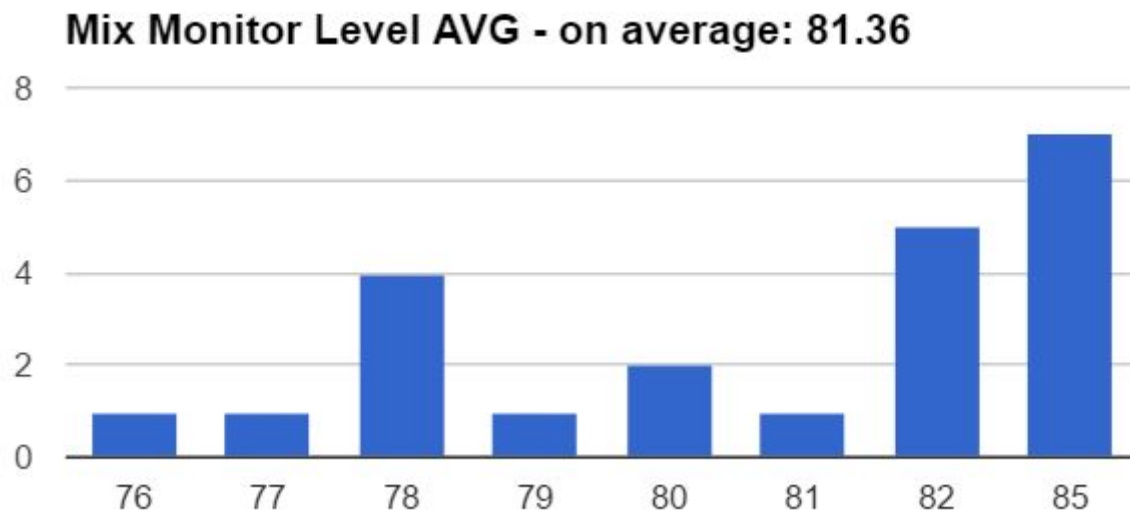


Fig.20

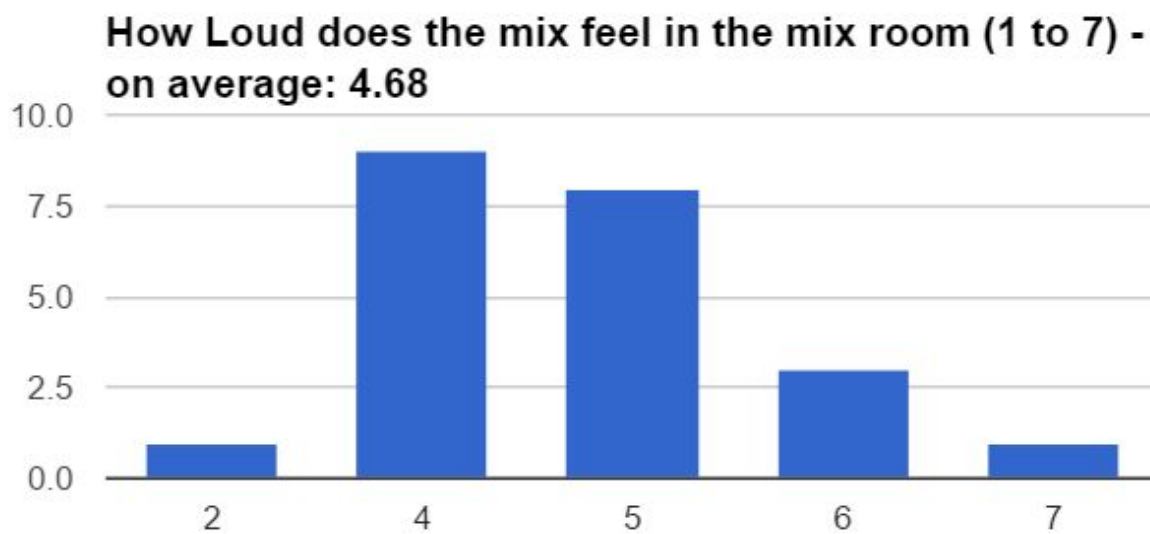


Fig.21

Approximative size of the room?

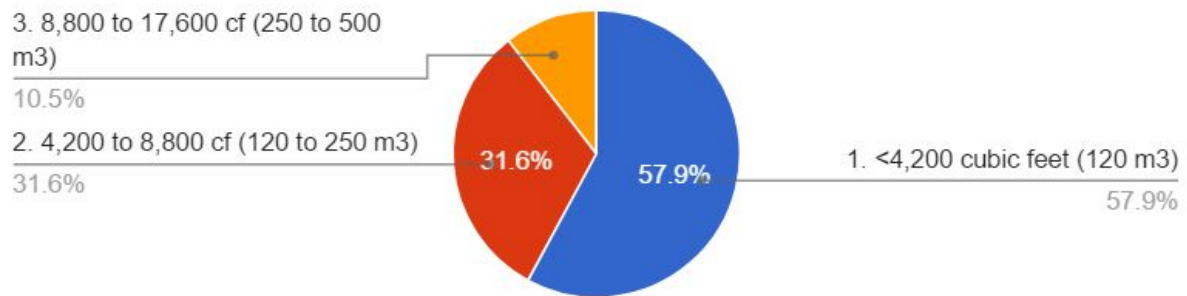
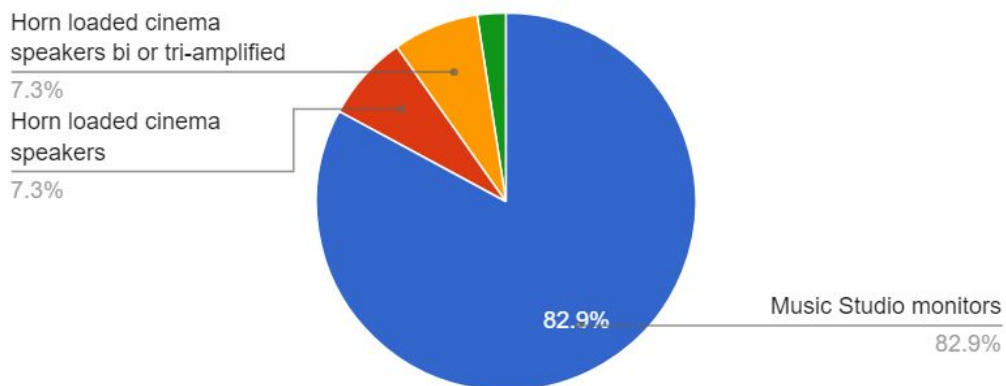


Fig.22

Screen channel speakers



A vast majority of these films are mixed on Studio Monitors in small rooms, but the loudness impression in the mix room is roughly the same as that of the large mix stages for high budget films. The result should be movies with much hotter levels for this tier vs the higher budgets.

If we go back to including all budgets for USA responses, here are the most common reasons for a different monitoring level:

Fig.23

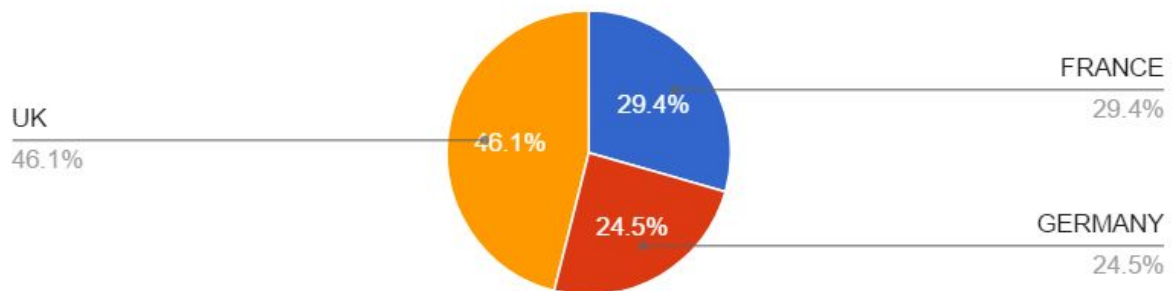
If the Monitoring is set at a level other than Dolby Fader 7 (85dB), what is the reasoning behind it?	Top results
Smaller room	56
Smaller room, Worried about playback levels in Cinemas	5
Worried about going deaf...	5
Worried about playback levels in Cinemas	5
Director thinks the level is too loud in the mix room	3
Smaller room, Producer/Director/Distributor request	3
Smaller room, Worried about playback levels in Cinemas, Worried about going deaf...	3
Producer/Director/Distributor request	2
85 is too loud, 78 is standard	1
Director thinks the level is too loud in the mix room, Worried about going deaf...	1
I often work on films that have a limited theatrical release and a much wider DVD/streaming release. Without a budget to do 2 proper mixes, I find monitoring at 82db on the mix stage tends to translate better when one mix has to be both limited (or art house) theatrical and wide iTunes/Netflix/DVD. If the movie will have a wider theatrical, I mix to 85, when it'll most likely be festivals and home video I mix to 82db. I often find most festivals and art house venues play movies too soft, so curbing my mixes slightly hotter tends to compensate. I have yet to hear a commercial mix of mine played back too loudly by theaters, but often I hear them played back soft. (Again, especially in art house or limited release venues, and especially at festivals)	1
Only if doing broadcast and need to hit lkfs spec	1
Only mix at a fix level based on K14	1

c - France, United Kingdom and Germany Responses

Number of responses: 102

Fig.24

What country do you operate in?



58.8% of responses come from people working mainly in Film, and 38% from Mixers working mainly for TV.

Average Monitoring level for Final Mixes is 82.25 dB (Dolby Fader 6.1) with a minimum of 73 (2) and a maximum of 85 (34).

Fig.25

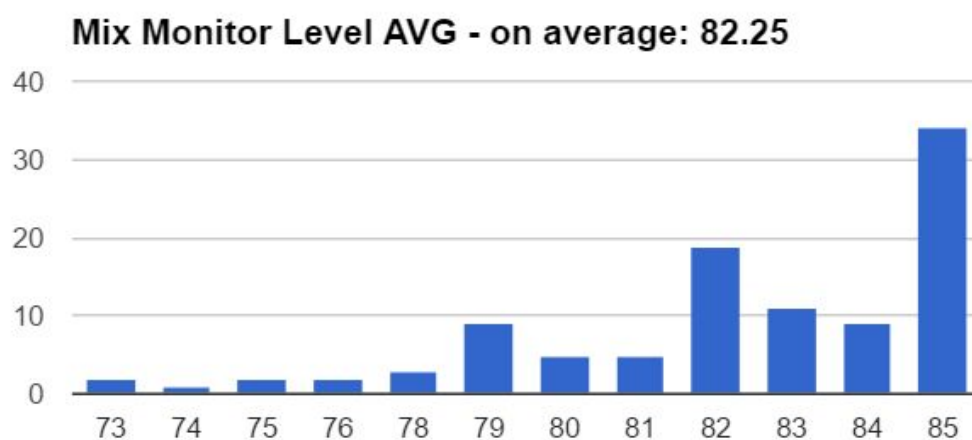
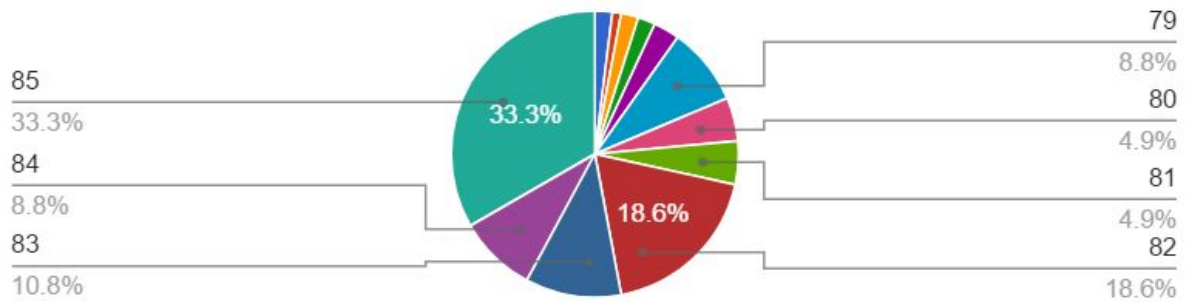


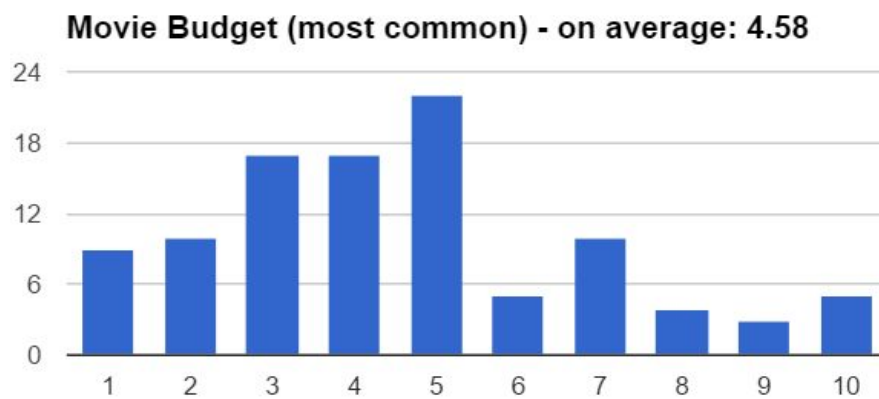
Fig.26

Mix Monitor Level



Breakdown by budget

Fig.27



Budgets 1 to 3

Fig.28

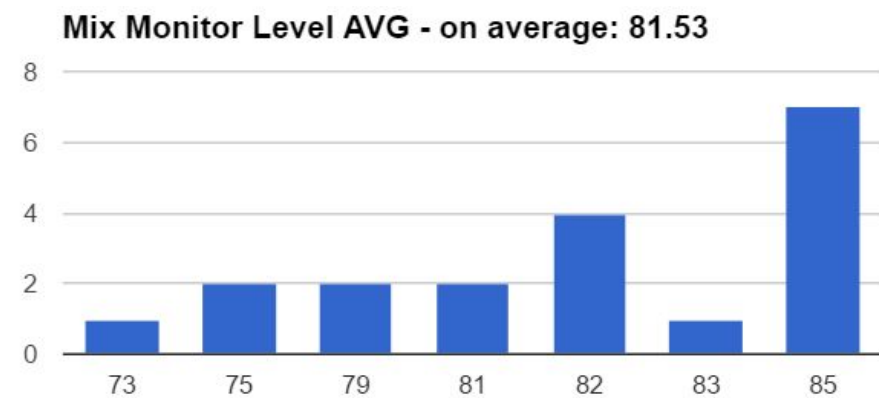


Fig.29

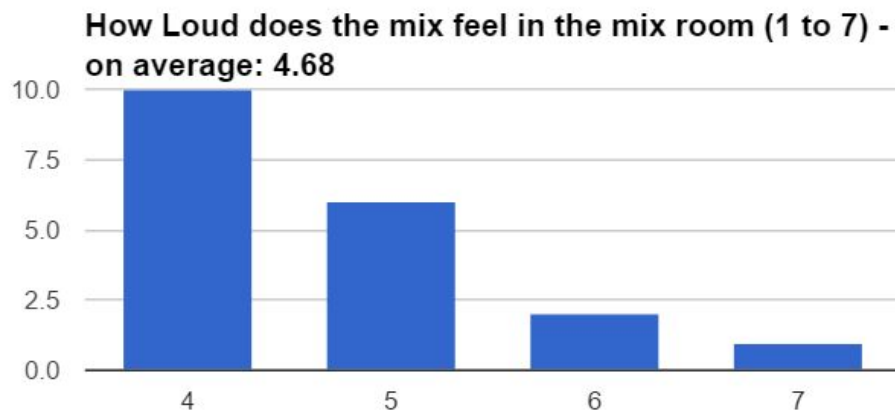


Fig.30

Approximative size of the room?

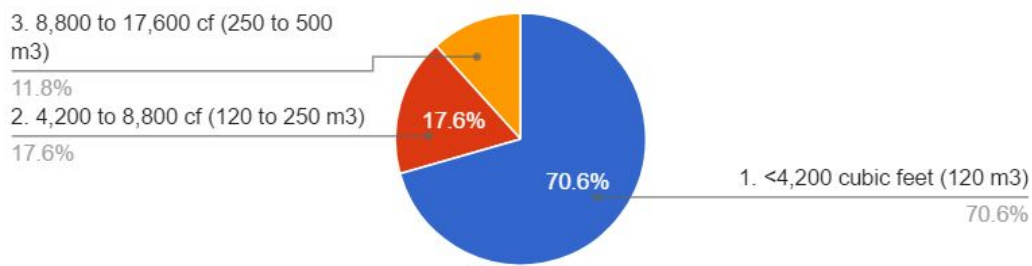
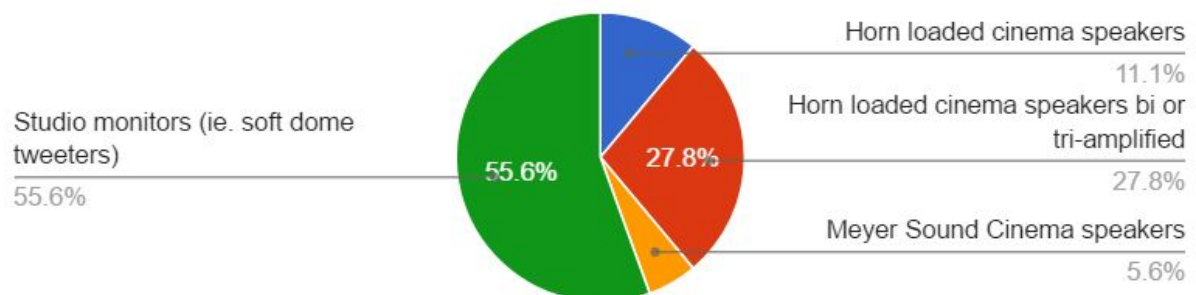


Fig.31

Screen channel speakers



Budgets 4 to 6

Fig.32

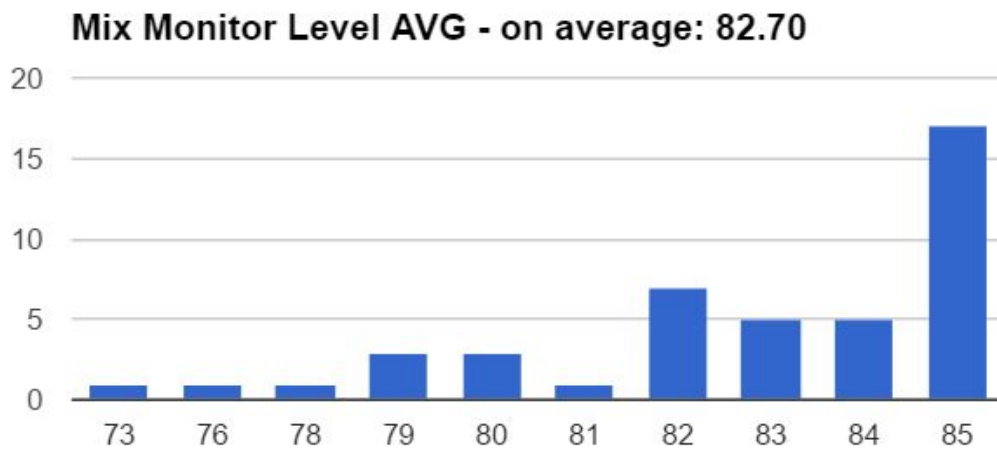


Fig.33

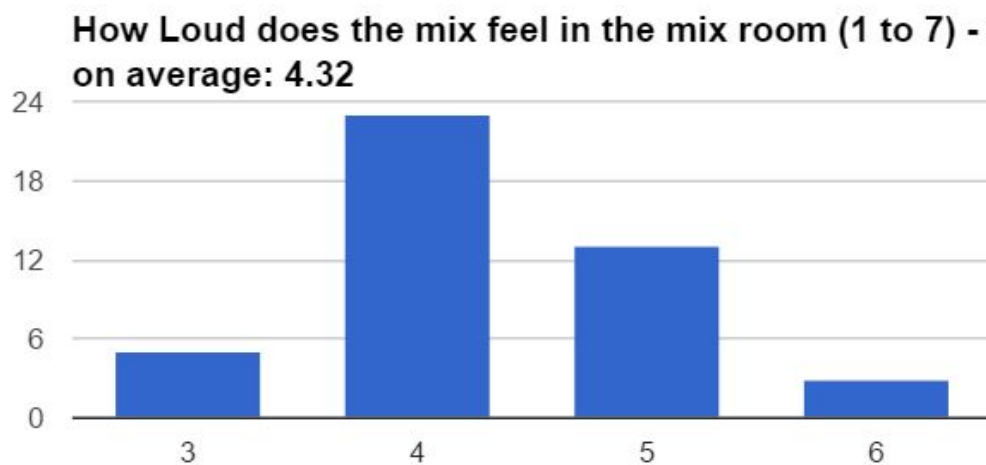


Fig.34

Approximative size of the room?

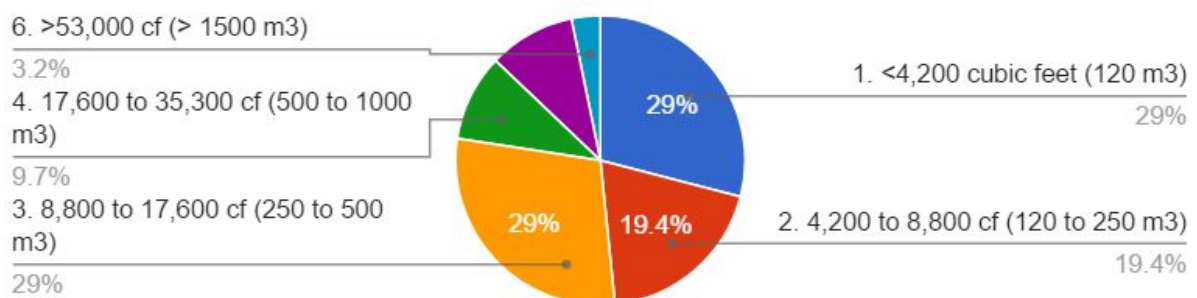
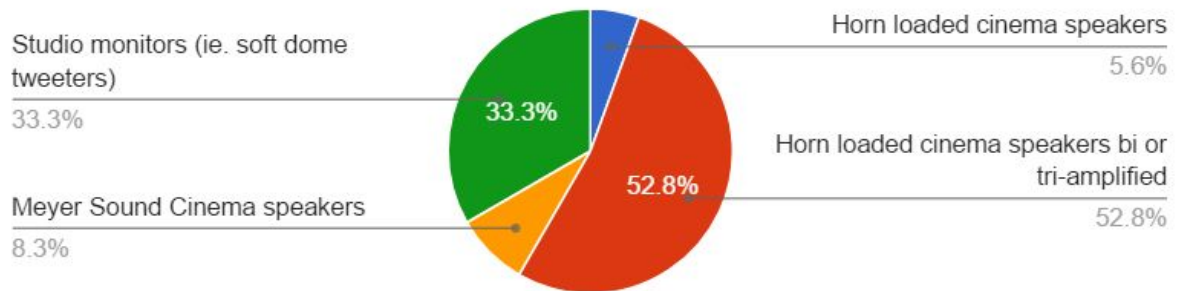


Fig.35

Screen channel speakers



Budgets 7 to 10

Fig.36

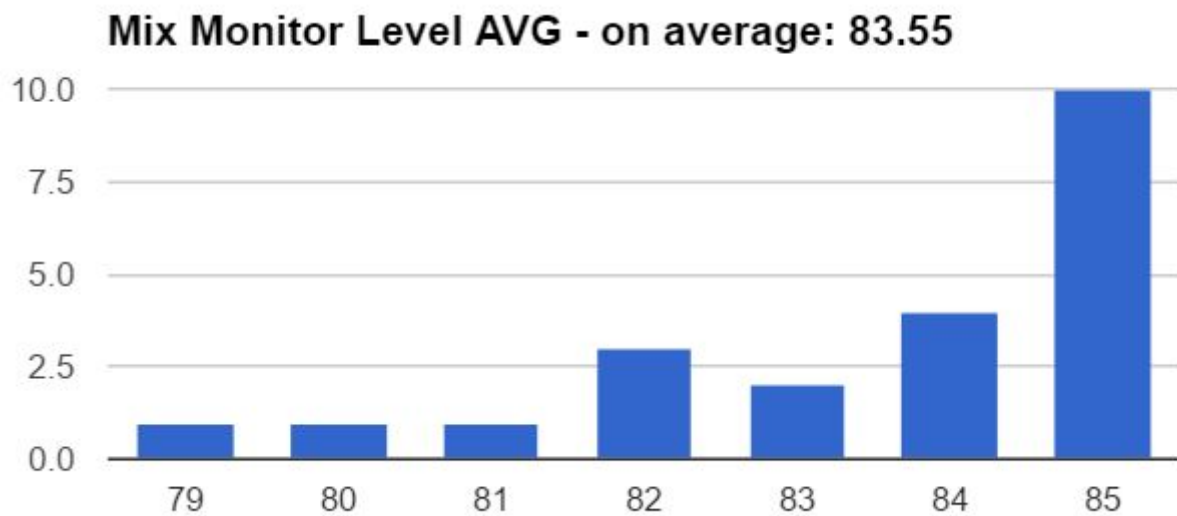


Fig.37

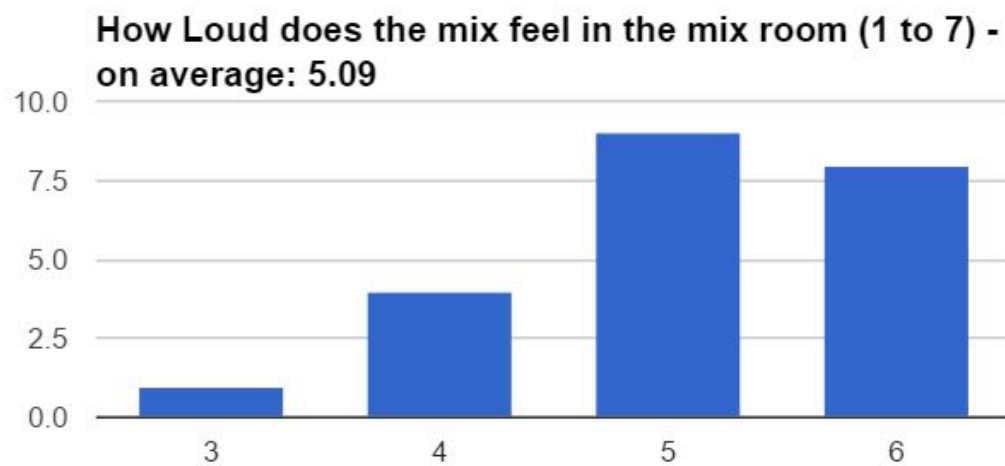


Fig.38

Approximative size of the room?

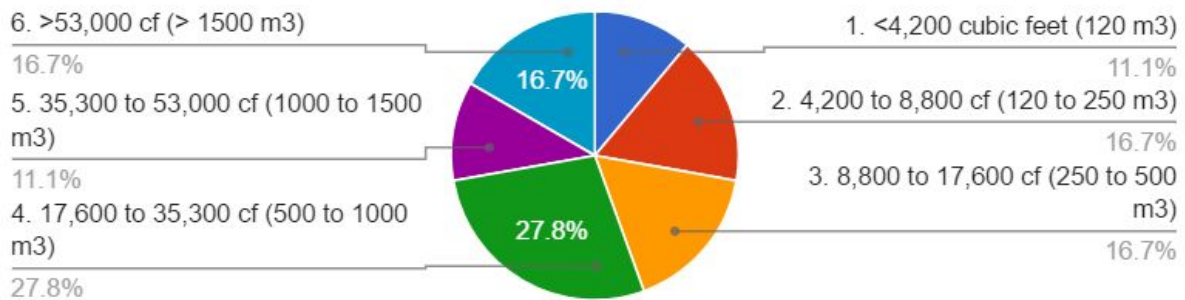
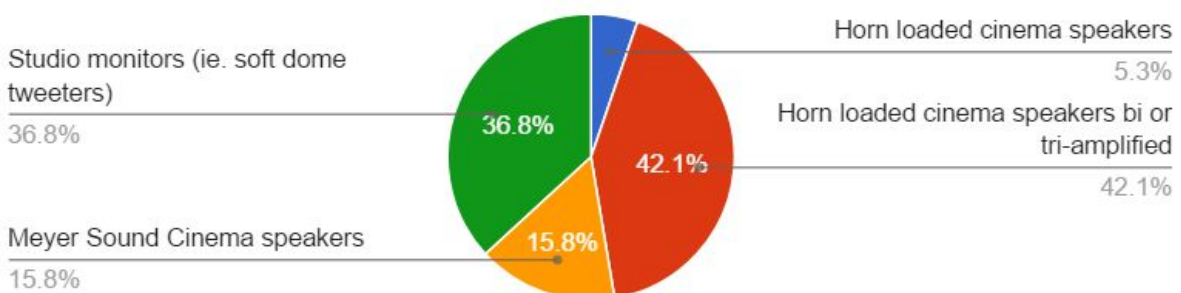


Fig.39

Screen channel speakers



All budgets included, top reasons for a different monitoring level:

Fig.40

If the Monitoring is set at a level other than Dolby Fader 7 (85dB), what is the reasoning behind it?	Top results
Smaller room	26
Worried about playback levels in Cinemas	20
Smaller room, Worried about playback levels in Cinemas	14
Director thinks the level is too loud in the mix room, Worried about playback levels in Cinemas	4
Worried about playback levels in Cinemas, Want "more punch" in the mix	3
Worried about going deaf...	3
Smaller room, Worried about going deaf...	3
Worried about playback levels in Cinemas, Producer/Director/Distributor request	2
Want "more punch" in the mix	2
Smaller room, Worried about playback levels in Cinemas, Worried about going deaf...	2
Smaller room, Worried about going deaf..., Want "more punch" in the mix	2
Director thinks the level is too loud in the mix room	1
Because I know that it will never be released at 7	1
Bad source material, often keep it lower so I don't go deaf, but put the volume up when I know there are no surprises.	1

d - Eastern Europe Responses

This group includes responses from the following countries: Bulgaria, Bosnia, Croatia, Czech Republic, Hungary, Latvia, Lithuania, Macedonia, Romania and Serbia.
There were no responses from Russia.

Number of responses: 19

84.2% of responses come from people working mainly in Film, and 10.5% from Mixers working mainly for TV.

Average Monitoring level for Final Mixes is 81.16 dB (Dolby Fader 6.1) with a minimum of 74 (1) and a maximum of 85 (3).

Fig.41

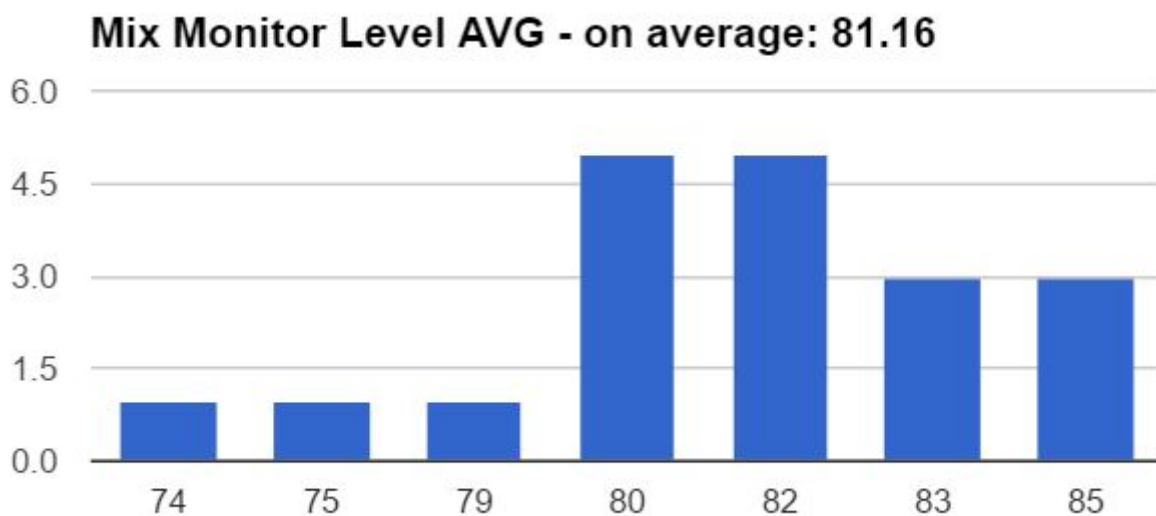
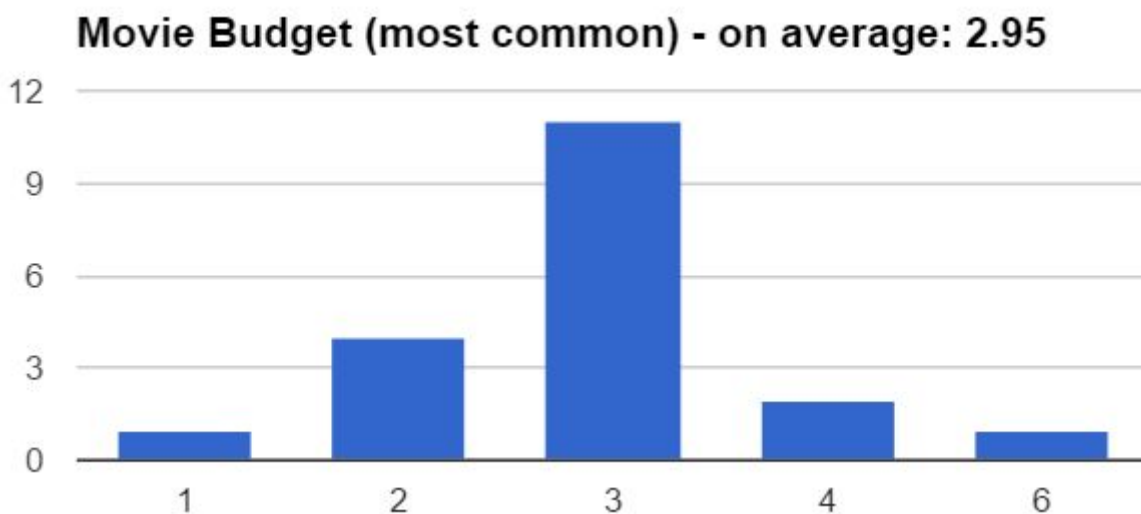


Fig.42



Due to the low budget average, I will not do a breakdown by budget for this group of responses.

Fig.43

Approximative size of the room?

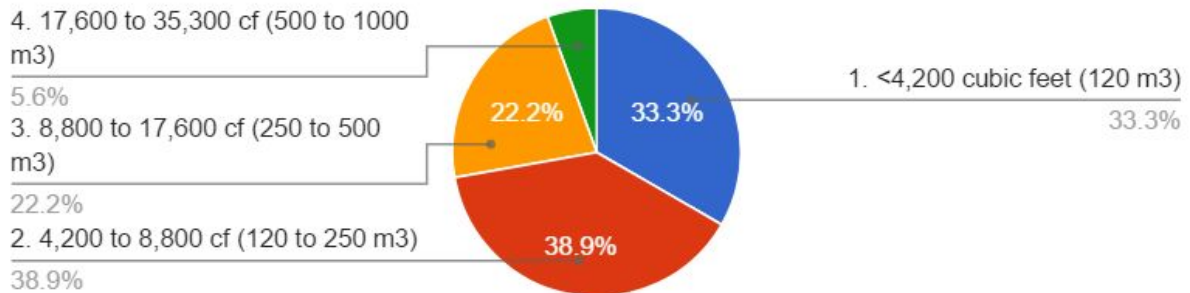


Fig.44

Screen channel speakers

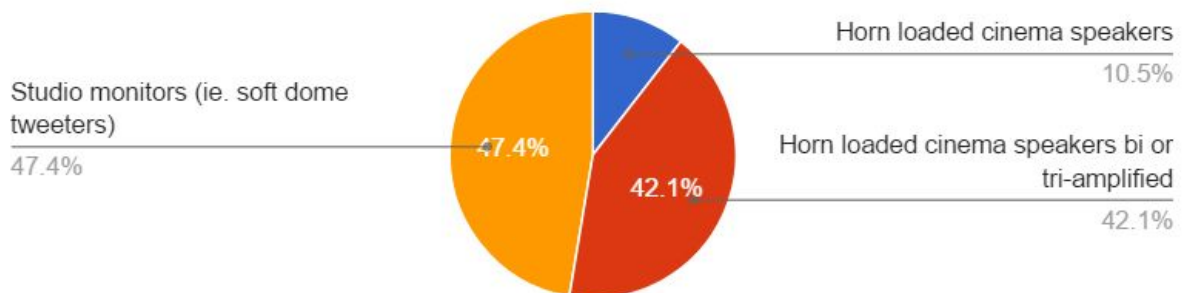


Fig.45

How Loud does the mix feel in the mix room (1 to 7) - on average: 4.32

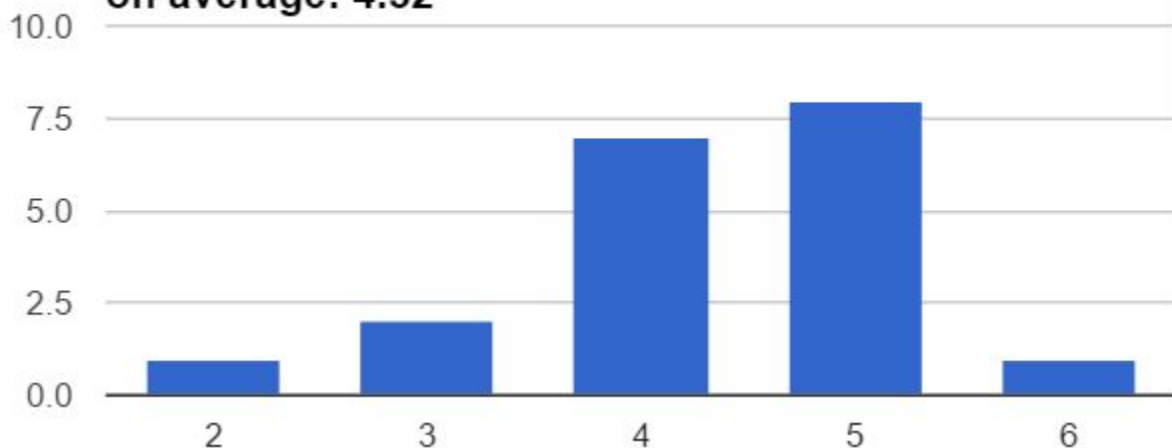


Fig.46

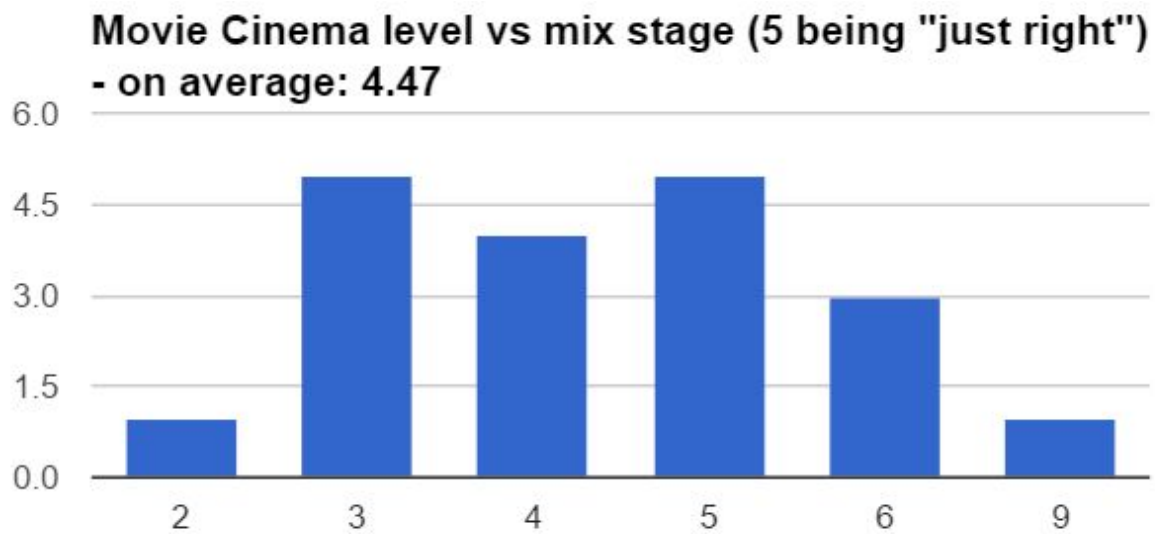


Fig.47

If the Monitoring is set at a level other than Dolby Fader 7 (85dB), what is the reasoning behind it?	Top results
Smaller room	6
Worried about playback levels in Cinemas	6
Smaller room, Worried about playback levels in Cinemas	3
Director thinks the level is too loud in the mix room	1
Director thinks the level is too loud in the mix room, Producer/Director/Distributor request	1
Director thinks the level is too loud in the mix room, Worried about playback levels in Cinemas	1
Want "more punch" in the mix	1

e - Asia, North Africa and Middle East

This group includes responses from the following countries: China, Myanmar, Philippines, Singapore, Vietnam, Algeria, Tunisia, Morocco, Egypt, Israel, Qatar.

Number of responses: 17

35.3% of responses come from people working mainly in Film, and 58.8% from Mixers working mainly for TV.

Average Monitoring level for Final Mixes is 81.18 dB (Dolby Fader 6.1) with a minimum of 75 (2) and a maximum of 85 (4).

Fig.48

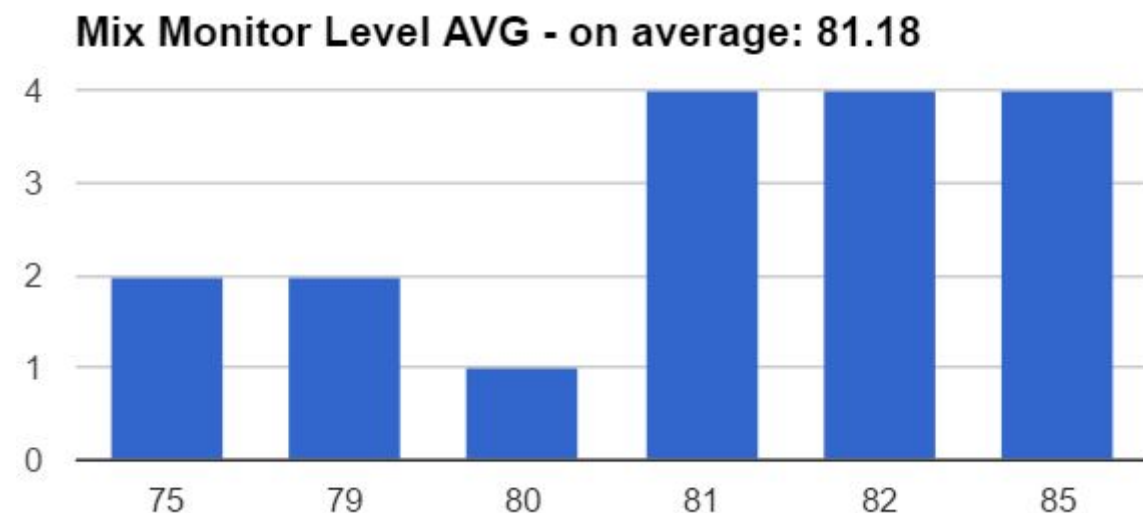


Fig.49

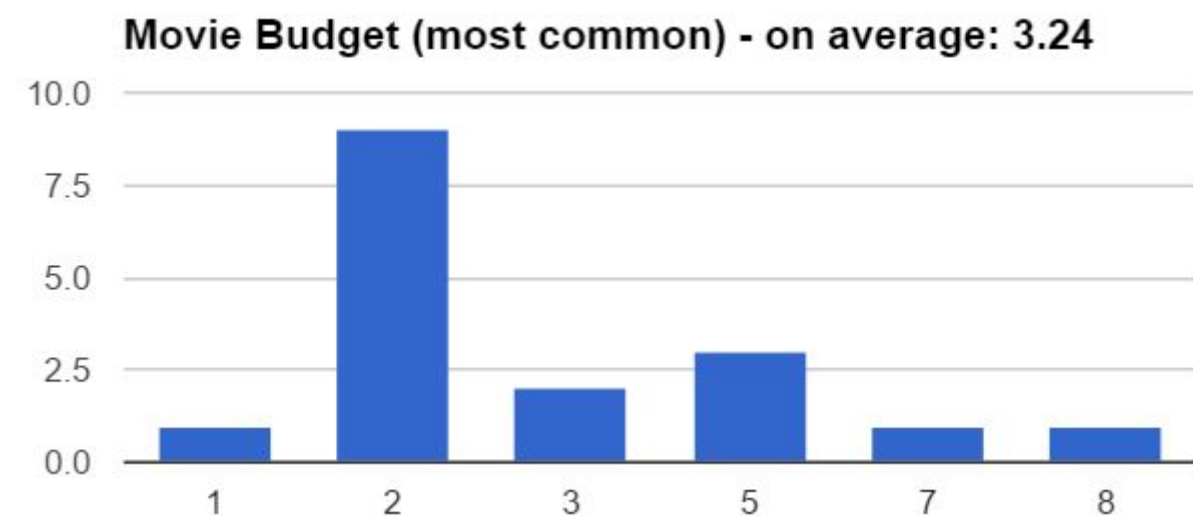


Fig.50

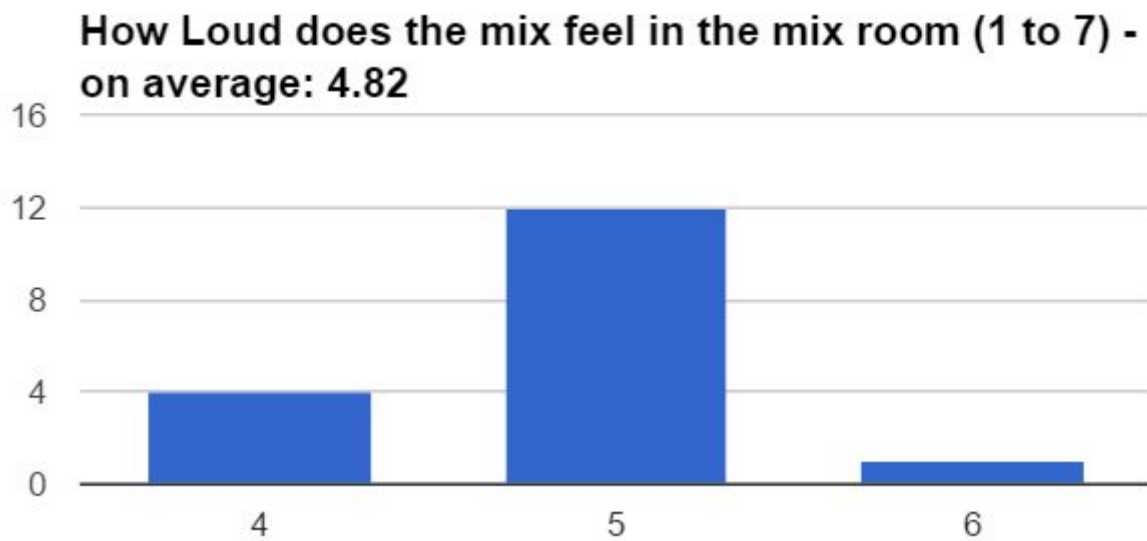


Fig.51

Approximative size of the room?

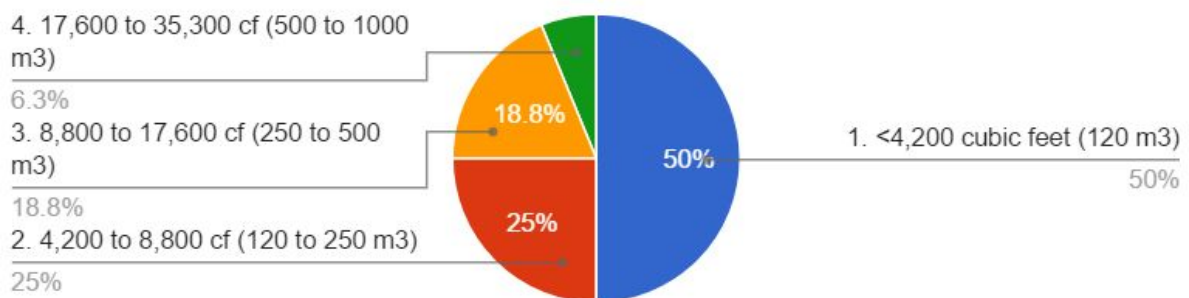


Fig.52

Screen channel speakers

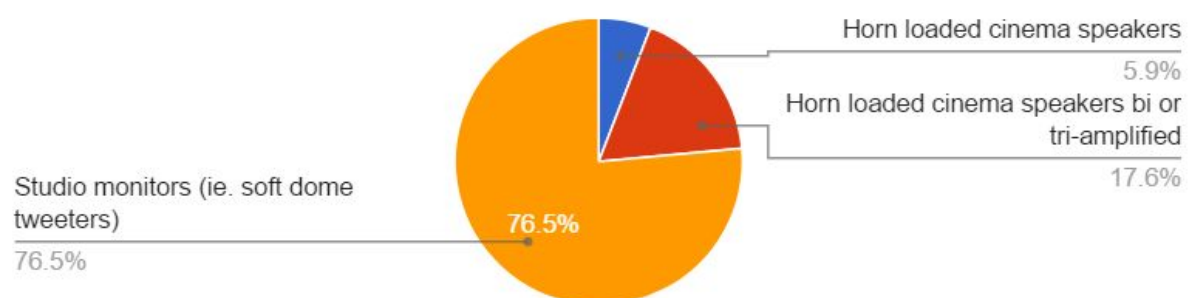


Fig.53

If the Monitoring is set at a level other than Dolby Fader 7 (85dB), what is the reasoning behind it?	Top results
Smaller room	6
Smaller room, Director thinks the level is too loud in the mix room, Producer/Director/Distributor request	2
Smaller room, Worried about playback levels in Cinemas, Worried about going deaf...	2
Smaller room, Director thinks the level is too loud in the mix room, Producer/Director/Distributor request, Worried about going deaf...	1
Worried about playback levels in Cinemas	1
Worried about playback levels in Cinemas, Want "more punch" in the mix	1

f - South America

This group includes responses from the following countries: Argentina, Brazil and Mexico.

Number of responses: 11

72.7% of responses come from people working mainly in Film, and 18.2% from Mixers working mainly for TV.

Average Monitoring level for Final Mixes is 83 dB (Dolby Fader 6.4) with a minimum of 77 (1) and a maximum of 85 (5).

Fig.54

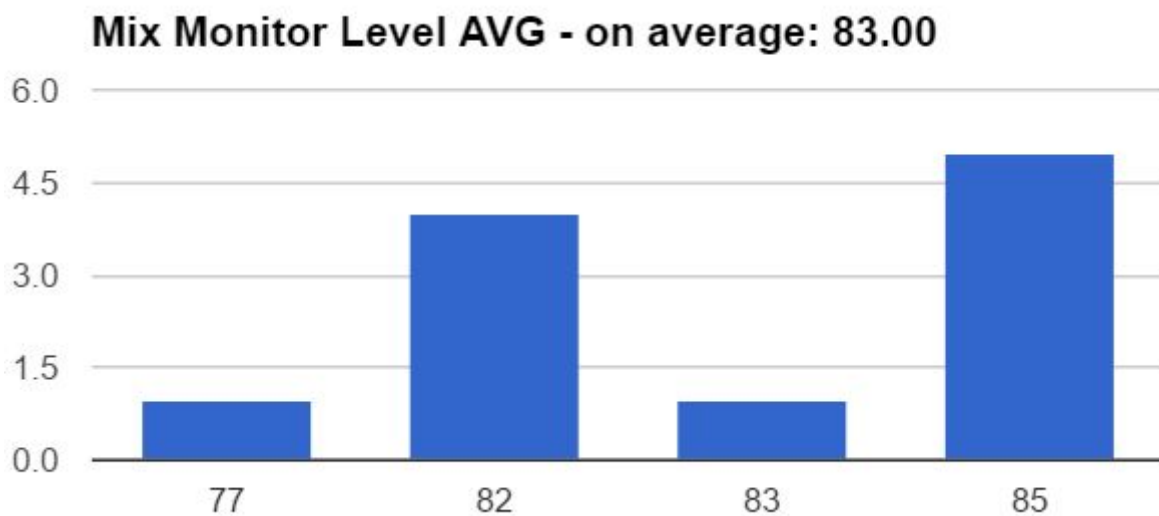


Fig.55

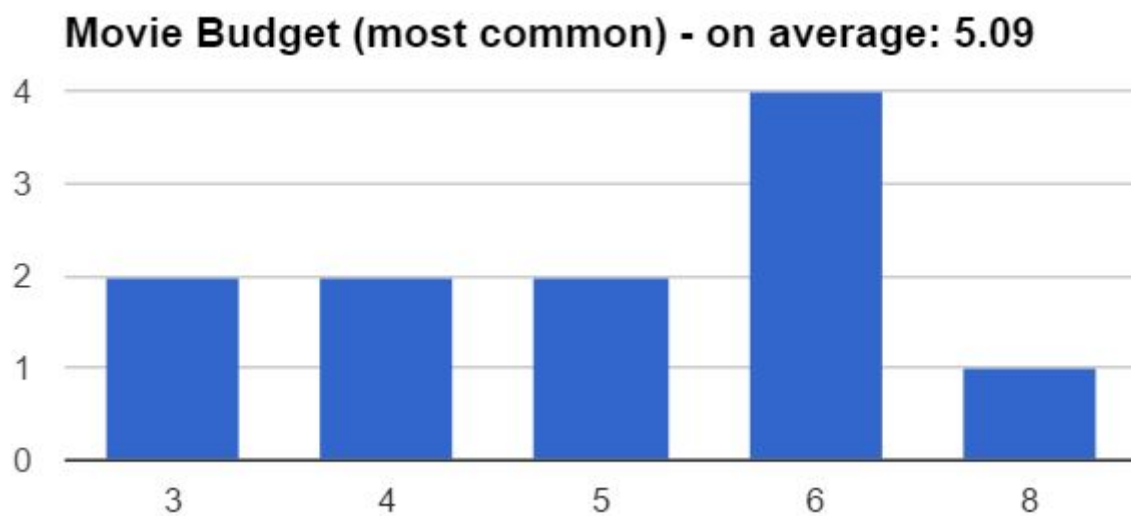


Fig.56

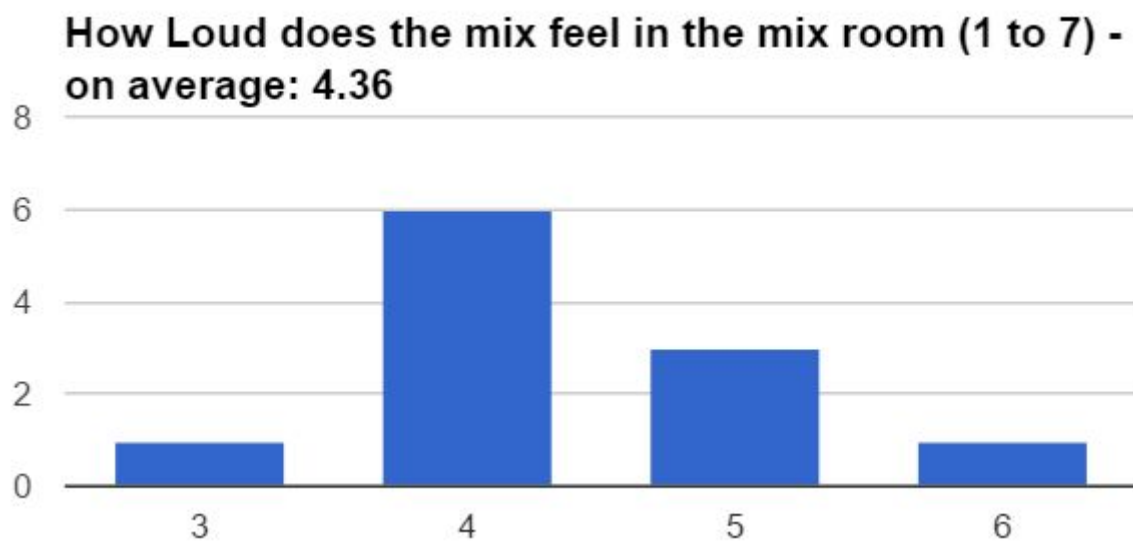


Fig.57

Approximative size of the room?

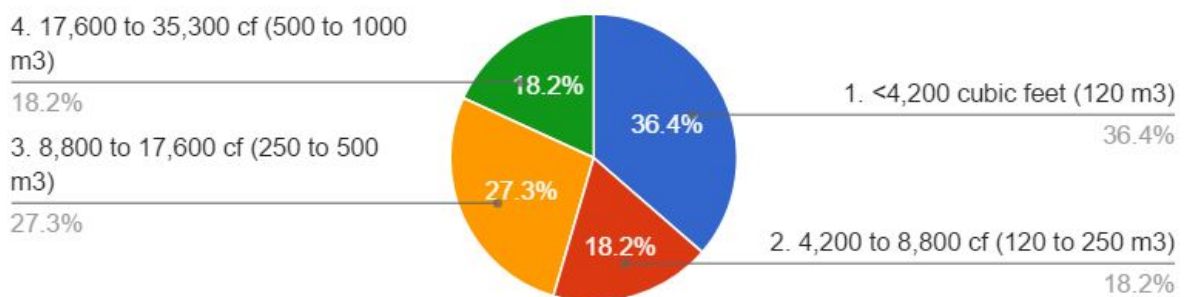


Fig.58

Screen channel speakers

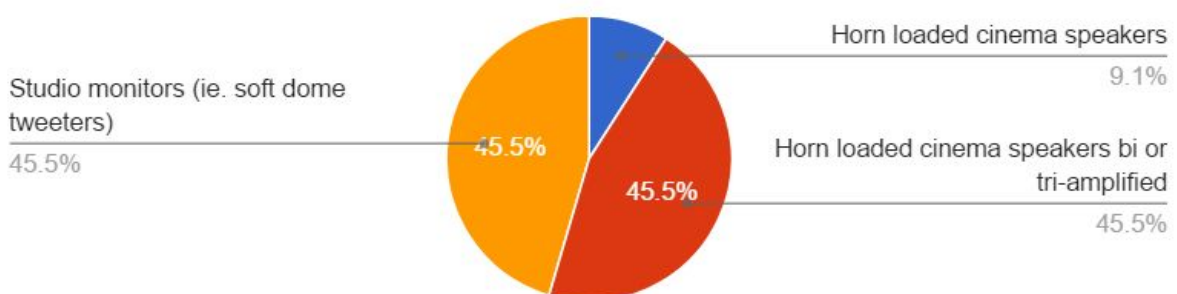


Fig.59

If the Monitoring is set at a level other than Dolby Fader 7 (85dB), what is the reasoning behind it?	Top results
Smaller room	2
Smaller room, Worried about playback levels in Cinemas	2
Producer/Director/Distributor request	1
Want "more punch" in the mix	1
Worried about playback levels in Cinemas	1
Worried about playback levels in Cinemas, The real playback level for brazilian cinemas is 4.5 to 5.5. And I already mesure dozens of multiplex. I Master 1 to 3 db up depending of the genre of the movie.	1
its the standard	1

5 - Conclusion and proposed solutions to the issue

It must be remembered that this survey, though quite successful at covering a good deal of countries, remains limited in the number of responses it received. As such the responses are only a sample, and might be subject to some bias (someone concerned with mix and playback levels is more likely to answer than someone who is not).

A few key elements stand out:

- If big budget movies are still mainly mixed in large mix rooms, at a level not too far off 85, many, many small-to-medium budget movies are mixed in small rooms, with generally lower monitor levels (in part to compensate for room size).
- Many of the aforementioned mixes take place using studio monitors which do not necessarily translate properly to cinemas in terms of dynamic response. Many theaters will end up exhibiting a mix that was deemed pleasing in the mix room, but that - once played back on average cinema speakers - will turn out to be quite aggressive toward the audience.

How can we solve the mix level discrepancy issue?

Some voices can be heard arguing that a system close to EBU R-128 and its various applications could be a good idea. I disagree with this, as that system imposes a target value for overall loudness for a project. I would argue that for a TV product that needs to fit into a broadcast workflow, with content often used as background sound in a living room that might work, but not in an area where many projects are driven by artistic sense rather than by Loudness Meter numbers.

Cinema is a storytelling media. Many would agree that one key element to telling a story is dialogue. With that in mind, I propose the following (very broad) guidelines for ensuring that films are displayed as intended in cinemas:

- A Dialogue Loudness measurement, akin to Dialnorm, would be the anchor for the main playback level. The cinema would have a written playback value (still ideally 7), or metadata for automated cinema playback systems for each movie.
- The overall content would be rated depending on overall dynamics, so that the audience can be warned that some or many loud passages may occur. These dynamics are relative to the Dialogue measurement.
- At no moment would filmmakers have to hit any form of target, be it Dialogue Loudness or Overall Dynamics, leaving full creative freedom.

With this system, all films should be displayed with Dialogue at what could be considered the proper level for the audience. Films could still have wide dynamic ranges, which is one of the reasons we love mixing for the film in the first place. In the long run, dynamics could come back into movies, with mixers and directors coming back to peak and valley soundscapes, always keeping in mind that a mix needs to show some form of robustness in any case to survive the wilds of cinema background noise (air conditioning and audiences).

I do hope, however, that we can manage to get some sense back into filmmakers and manage to get back to mix levels that will be both pleasing to the audience and non-frustrating for the directors and producers.