

# A DJ's guide to turntable isolation

*By TJ Hertz / Objekt – 12/4/2017*

*I've written this guide as an appendix to my tech rider but also as a standalone guide, since this information has served me pretty well for the last few years and I've had the same conversation with so many other artists that I thought it might be handy to consolidate some tips into a single PDF that I could share.*

*It's aimed at touring DJs who are able to request whatever equipment they need from the promoter or venue – the materials required are cheap and readily available but obviously it's not practical to take your own concrete blocks on a Ryanair flight.*

*Feel free to quote or use this info as you wish – a mention would be nice if you do.*

## THE SHORT VERSION (promoters/bookers please read)

**If you're a promoter and you've been sent this as an addendum to my rider then don't feel obliged to go through the whole thing (unless you're curious). Just read this bit below!**

Turntable feedback is unacceptable during a performance under any circumstances and should be prevented as follows:

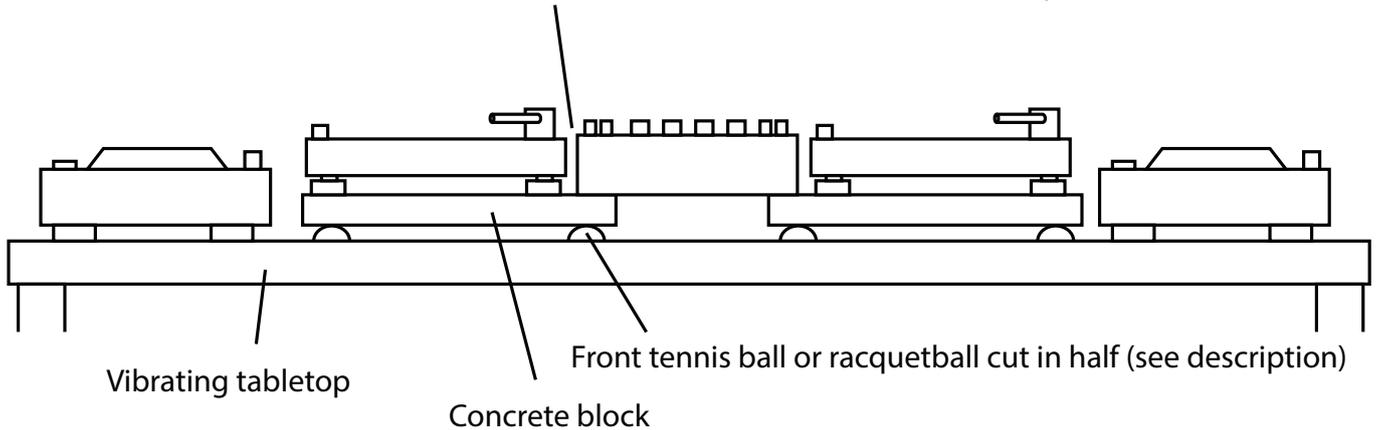
- Please supply at least two solid concrete blocks, minimum size 50x40x5cm, to place under the turntables.
- I will bring squash balls to put under the concrete blocks, isolating them from the vibrating tabletop.
- A soundcheck should be arranged at least one hour before doors open, at full volume and with the sound engineer present.

Thanks in advance!

# Turntable isolation setup

## Standard setup (works 90% of the time)

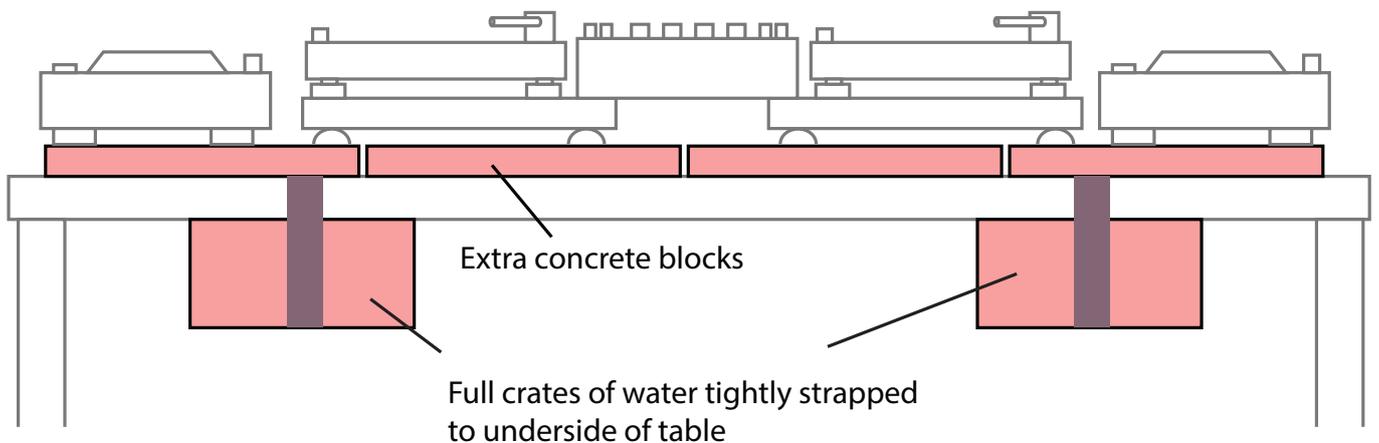
*If the concrete blocks are big enough, you can put the mixer on top as well, but be careful not to let it touch the side of the turntables or the isolation will be compromised*



In the above setup, the heavy concrete blocks are isolated from the vibrating table by the rubber balls, providing a vibration-free surface for the turntables to sit on.

## Extra isolation if needed

*In cases of extreme low-frequency feedback, the tabletop itself may need damping with concrete or other weight*



Here, the vibration of the tabletop itself is first damped by strapping heavy stuff to it (concrete and/or water crates); then, the first technique is applied on top of that.

# THE LONG VERSION

## The basics: What is turntable feedback?

Turntable feedback is the swelling, droning feedback tone that occurs when you play a record on a turntable which is inadequately isolated from the vibrations of a large soundsystem. It gets more aggressive as more gain is applied (i.e. as you turn up the volume). It's audible over the music and it sounds really awful. In principle turntable feedback is identical to the squealing feedback you get with microphones, except it occurs at a much lower frequency and is (usually) transmitted through the table rather than the air. Turntable feedback is a universally Bad Thing and is not acceptable during a performance.

If you put your Technics directly on an ordinary table and put the table near a soundsystem then it's almost certain you won't be able to play any records without experiencing feedback problems.

## How to test for turntable feedback

Proper testing during soundcheck is crucial. (Soundchecking is obviously also crucial.) The first step in dealing with vinyl feedback is to establish how much of an issue it is, or whether it's an issue at all. This is my method:

1. **Set up the decks** as you like them. Check the turntables are working in a basic sense – pull out a record and check both sides are coming through, there's no ground hum, no distortion etc. Fix these issues first if anything is amiss.
2. **Set your levels** using a CDJ or other digital source if possible. Play a track that you're familiar with. **Set everything – input gain, master level, booth level – as you would run them at peak time and ask the sound engineer to turn the soundsystem up as loud as it'll go**, erring on the loud side. Ask the sound engineer if they might further bump up the volume later on as the club fills up. If they say yes then ask them to already turn it up now for the soundcheck; it's important to test at the maximum realistic volume. Go into the room and make sure you're happy with the level.
3. If you're so inclined, **EQ the system** with the engineer so that it sounds how you want it to sound. Do this *before* you start testing for feedback.
4. **Now grab your quietest record** – the one where you need to turn the input gain up really high in order to get a decent signal out of it, e.g. an album with 4 tracks per side. Cue it up, and without adjusting the master or booth level, adjust the input gain so that the meter is showing the same level as the digital track you just played. (You'll probably have to turn the gain up quite high – this is the idea. On a Xone 92, with an extremely quiet record, I can easily max out the input gain without hitting the red, which is a useful rule of thumb given that I always use a Xone 92.)
5. **Play this record over the system and make sure it sounds ok.**
6. **Now the test itself – start the turntable and drop the needle in the silent locked groove at the end of the record** (you could also do this with the needle resting on a stationary record but this tends to produce feedback very easily and is not actually a realistic use-case, making it an unfairly harsh test IMO). **Pull up the channel fader to maximum. Tap the turntable a few times and listen.**
7. **If the turntables are properly isolated, you should just hear the amplified sound of your finger tapping the turntable.** If on top of that you hear a low-frequency tone swelling in volume (don't confuse this with ground hum!) or mid-pitched whine, your turntable is feeding back and you're going to have problems. Read on.
8. **Even if you don't hear any feedback at this level, try turning up the input gain a bit further just to be sure, likewise with the booth monitor level.** It's always possible that things will get louder over the course of the night whether you like it or not, and it's important to leave yourself some headroom.
9. *(If feedback does occur, pull back the input gain until the system is just on the edge of feeding back, and make a note of this setting. **The level of input gain at which feedback occurs – “gain before feedback” – is the best measure of how effective your isolation is, and is a useful metric to remember throughout the course of the night.** The hope is that by adding isolation you'll be able to increase this threshold level, allowing you to play quieter records at full volume without feedback.)*

## What to do if the turntables are feeding back

Don't panic – check the following basic things first:

- Is one turntable feeding back badly, but not the other? Try swapping the turntables to see if the problem persists – feedback can result from a faulty turntable. If this is the case you may need to swap the turntable for a spare.
- Make sure the turntable frame is not touching any other object (e.g. the mixer or a CDJ) – this bypasses the isolation in the turntable feet.
- Make sure the feet are level and not tilted, touching the turntable frame, or screwed in too tight.
- Make sure the cables to the turntable aren't stretched tight – they can transmit mechanical vibrations if so.

If none of the above helps (which is quite likely) then you're going to need better isolation depending on the type of feedback.

There are essentially two kinds of turntable feedback:

1. **Low-frequency feedback**, a.k.a. rumble, is by far the most common and sounds like a low-pitched drone or rumble, generally under 100 Hz. Sub frequencies from the soundsystem vibrate the surface (e.g. tabletop) on which the turntable sits; these vibrations pass through the turntable feet and are picked up by the needle, the signal from which is amplified by the mixer and then fed back into the soundsystem. This creates a closed feedback loop and leads to the characteristic "rumble", which, without adequate isolation, can only be dealt with by turning down the bass or turning down the volume (neither of which is an acceptable solution). This kind of feedback is relatively easy to fix by isolating the turntable from the surface it's sitting on.
2. **Airborne feedback** is less common and sounds more like a howling tone at around 200-500Hz, occasionally higher, depending on the needles used and the acoustics of the room. It is transmitted through the air rather than through the tabletop and is therefore more difficult (but not impossible) to fix, usually requiring precise digital EQ (or, less practically, acoustic treatment or repositioning of the soundsystem). Concrete box rooms are often the worst for airborne feedback.

If in doubt as to what kind of feedback you're dealing with, carefully lift the turntable up from the table while conducting the feedback test and playing the lead-out groove (you might need to ask the engineer to do this while you ride the channel fader to prevent the feedback getting out of control). If the feedback disappears when you lift up the turntable, it's likely to be structure-borne feedback (type 1). If it carries on, it's probably being transmitted through the air.

In some cases, you successfully isolate against rumble only to find that you have to deal with airborne feedback too!

## Preventing low-frequency feedback (with concrete and frontenis balls)

Low-frequency feedback, a.k.a. rumble, is relatively simple to deal with. Feedback under about 150 Hz is almost always transmitted through the surface that the turntable is sitting on. A very basic litmus test is simply touching the tabletop while playing music at full club volume – if you can feel any vibrations whatsoever, then without further isolation you're very likely to have rumble problems. (Even if you can't feel any vibrations with your bare hands you might still have feedback problems.)

So the goal in preventing structure-borne feedback is essentially to create a vibration-free surface. Here's how to do it effectively for less than €15:

1. Put a **concrete paving slab** under each turntable. These should be at least the size of a Technics 1210 and about 5cm thick. The heavier the better – the mass is very important as heavy things are difficult to vibrate. They're readily available from garden and home improvement centres for less than €10 each.
2. Cut two **frontenis balls** (NOT regular tennis balls) in half and rest the concrete block on the halves, one half under each corner. The concrete should bounce very slightly if you push down.

This is basically the industry standard solution (except for using frontenis rather than squash balls – more info below) and is extremely effective at stopping vibrations from coming through the table.

The reason for using frontenis balls rather than squash balls (or anything else) is that they provide the right amount of bounciness underneath the concrete mass **when cut in half**. Squash balls are great but they need to be used whole, otherwise they compress too much and don't bounce, which is problematic because you need to find some way of preventing the concrete block from rolling all over the place (often easier said than done since gaffer tape doesn't always stick to concrete). Frontenis balls, meanwhile, are a bit like racquetballs but slightly smaller and more firm. Because of the firmness, they provide the perfect amount of springiness when you cut them in half, and the fact that they're cut in half means that they won't roll around.

Frontenis is a pretty obscure sport that nobody outside of Mexico and Spain has heard of (I chanced on the balls by accident at a shop in Barcelona). But you can order the balls very cheaply online from Decathlon, at the time of writing. IMO, if you're serious about playing vinyl it's absolutely worth taking a few of them with you to your gigs (and asking the promoter to supply the concrete blocks). I would estimate that they've rescued the vinyl setup at at least 30% of my gigs over the last few years.

In my experience the above method eliminates low-frequency feedback in about 90% of cases, including most clubs. (Concrete without the balls works about 30-50% of the time.) Both the concrete and balls are equally important – the slightly springy frontenis balls decouple the mass of the concrete (which is difficult to vibrate because it's so heavy) from the vibration of the table, a bit like how a car suspension allows the car to "float" relatively steadily over a bumpy road. If you touch the table, and then the concrete block, while music is playing, you'll notice that while the table might be vibrating like crazy, the isolated concrete block should be completely still.

In extreme cases, e.g. large festival stages that transmit so much bass that you can't even put a drink on the table without it flying off from the vibration, this setup may not be enough. In such cases you may need to weigh down the table first, in order to dampen the tabletop's vibrations as much as possible, before then employing the tennis balls and concrete as previously described. For example, you could put a concrete block directly on the tabletop to dampen the surface, and then put the balls and a further concrete block on top of this one, with the turntable on top of that (like a sandwich). In desperate, DIY cases you can even strap full crates of beer to the underside of the table or – if you're at a festival – gather a bunch of the heavy bases that they use for fencing and simply place them on the table around the decks. (Thanks to Stev at Audile for the last couple of tips – they've been lifesavers!)

Finally, if necessary you can also tackle low-frequency feedback with notch EQ (see below). Sometimes, feedback at extremely low sub frequencies (under 30 Hz) can even be dealt with using a low-cut filter, especially if it's only coming through the monitors rather than the main subs. For audio fidelity reasons I try and avoid this and deal with the problem at the source if possible, using proper mechanical isolation, but sometimes if the feedback is coming from the booth monitor subs only then I'll just mute or turn down the booth sub.

## Preventing airborne feedback

Airborne feedback is more difficult to address because you can't really isolate a turntable from the air. It tends to be more common in reverberant or echoey rooms, especially concrete rooms, and can come from either the main soundsystem or from the monitors (both equally common as far as I can tell). It's almost always higher pitched – 200 Hz or above – and depends heavily on the needles and the acoustics of the

room.

Typically, airborne feedback needs to be notched out by very precise, narrow-band EQ (i.e. a digital parametric EQ or a 30-band graphic EQ), which you would need to ask the sound engineer to do for you. Establish first whether the problem is coming from the main PA or from the monitor speakers by muting each in turn and testing for feedback. Then ask the sound engineer to sweep a notch filter in the appropriate channel (main or monitor), and make the necessary cuts with as narrow a Q as possible (any decent engineer will be familiar with this technique). For reference, I found that Shure M44-7s tend to feed back very easily at around 260 Hz (which is a shame as they're otherwise my favourite DJ cartridges). Ortofons seem much less susceptible to airborne feedback, and when they do it tends to be at a higher frequency (which I can't remember off the top of my head but I think might be 450Hz)

In some cases, record weights can help with airborne feedback, though generally the difference is slight. Repositioning the monitor speakers can also make a difference in some cases, although I've found that moving them further away just makes you turn them up louder, negating the effect.

Bear in mind that airborne feedback is often significantly improved by filling the room with people (also true of structure-borne feedback albeit to a lesser extent).

### Other methods (some better than others)

Concrete blocks, frontenis balls and EQ are (in my opinion) the best way to deal with feedback but other options do exist:

- **Isonoe feet.** These are quite common, especially in well-equipped clubs and with good rental companies, and I've found they're actually almost as effective as concrete. However, they're very expensive and it's also extremely important that the elastic bands are regularly replaced, since the isolation is compromised as the rubber starts to sag and the setup eventually becomes totally ineffective when the rubber sags so much that the metal feet touch the turntable base. They're also better with the rubber gel pads (available separately from Isonoe) than without.
- **Inflatable "free-float" cushions.** These are inflatable orange PVC pillows which you put under the turntables. They are truly awful – precariously unstable to the point of being unusable, and not even that effective at preventing feedback. Avoid at all costs.
- **Foam or rubber mat under the turntable.** These are better than nothing, but really do not offer enough isolation except in the mildest of cases.
- **Putting the turntables in flight-cases.** This doesn't work and is likely to make the problem worse because the sides of the flightcase touch the turntable, bypassing the damping in the turntable feet.
- **Metal frame with suspended turntable platform.** You see these at a few festivals and bigger clubs, often in Holland. They're ok, but the concrete weight on these is quite small and the rubber isn't really elastic enough, so they're not always effective enough compared to full concrete blocks and squash balls. When faced with these things I often end up putting the whole structure on frontenis balls for additional isolation.
- **"Mag-lev" platforms.** These are quite obscure – I've actually only seen them once, also in Holland. They worked pretty well in that room (quite a tricky setup acoustically from what I remember), but they're expensive and quite wobbly. I wouldn't necessarily recommend them.
- **Ashtrays (or rolls of gaffer tape) and rubber bands, like this:** <http://i39.tinypic.com/a1su11.jpg>. Better than nothing, and sometimes saves the day when nothing else is available, but they're not tremendously effective and they make the turntables very bouncy.