MONOMONO

Console 80

Vintage channel strip suite
for Ableton Live

v1.0

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Foreword

My journey as an audio engineer started around 2017. I was fascinated by the hardware and on top of things I wanted to stay away from the computer which I've spent most of my days at. I've bought a 32-channel Allen & Heath live desk to test the waters, couple of hardware EQs and a pair of 1176 and that's when my hardware collection had started.

Quite a few years later I've met an electrical engineer, who was just as I am — absolutely fascinated with audio hardware. We've became friends and with his help I've started learning about the actual circuits and components. I was curious to learn what actually makes the difference in the audio circuits.

Console 80 is the result of years of trial and error, a result of separating mythology from reality and finding the real ground in why these circuits covered with the layers and layers of fairy dust sound so good and what exactly makes the process of working with music so enjoyable.



Console 80

Console 80 is a set of channel strips, a compressor and a bus amp for Live, modeled on Neve desks of the late sixties and early seventies: six devices from four distinct circuits of the era, modelled part by part.













Lineage

Rupert Neve formed the company that bears his name in 1961. In March 1969 it moved into a new factory at Melbourn, south of Cambridge, and that year brought its first all-silicon channel module. The recipe was set: a transformer in, small amplifier boards running in class A from a single 24-volt rail, and a transformer out.

The desks were built to order. From 1969 every custom console carried its own job number, the first for a television studio, and was laid out to the customer's brief: how many channels, which equalizer, how many groups, where the compressors went. Underneath, they were modular: every channel, compressor and group amp was a module or a card in a frame, so a desk was a choice of parts.

In 1970 the 1073 arrived on a London studio's desk, the company's first with 24 groups. Its data card calls it the older module "with different frequencies": three bands, a fixed 12 kHz shelf, a four-step high-pass. On paper little set it apart from what came before. The reputation came later. In 1971 a standard range followed for quicker delivery, and the 1073 went on to serve in standard desks such as the 8014.

In 1972 the line branched. The 1084, drawn as its successor, added switchable treble, a narrower Hi-Q setting on the mids and a low-pass filter around much the same preamp, while the 1073 stayed in production beside it. The 1081, drawn that year for a single desk in Paris, went to four bands and was the first channel module to leave class A at its output; most 8048 desks left the factory with it.

Alongside them worked the 2254, a compressor David Rees designed around a diode bridge, and the 1272 line amp that lifted the mixed channels back up to level.

Inside Console 80

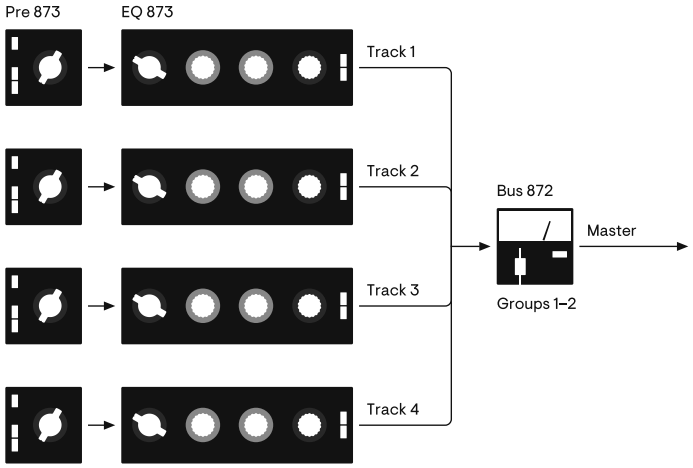
Console 80 brings the way these desks were built into your Live session. Its aim is to let you build a desk of the period to your own spec. Each device is one of those modules, modeled part by part from its factory drawings: the transistors, transformers and coils of its signal path.

You don't need gorilla hands to run a desk of any size with any number of modules. Choose the channels, the equalizers, where the compressor goes and which tracks share a group, and build the desk your session needs. Every channel carries its own component tolerances, so no two tracks are quite identical.

The four desks below and overleaf are examples. Each follows the documented signal path of a desk of the period, built from the Console 80 devices modeled on its modules. Set them up in your Live session as shown, or use them as a starting point for your own.

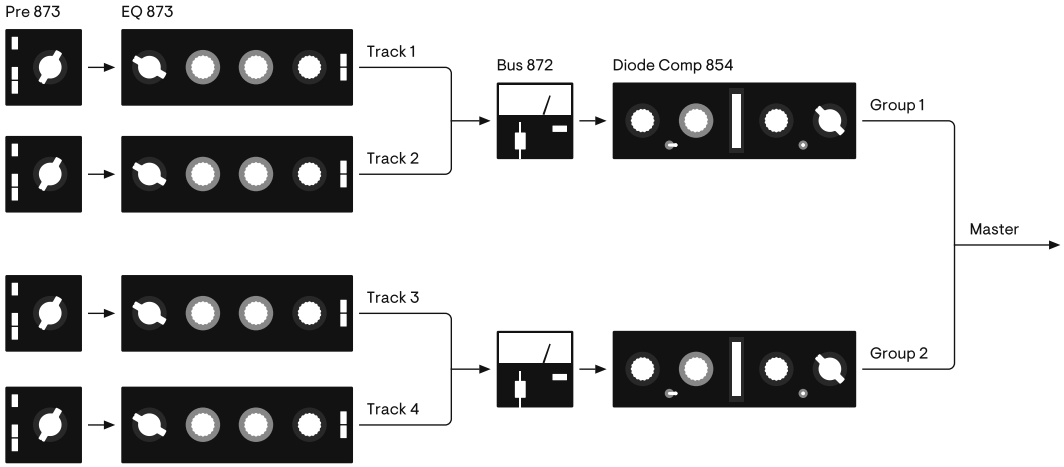
BCM10

Ten 1073 channels into two groups, the desk's left and right outputs. No compressors.



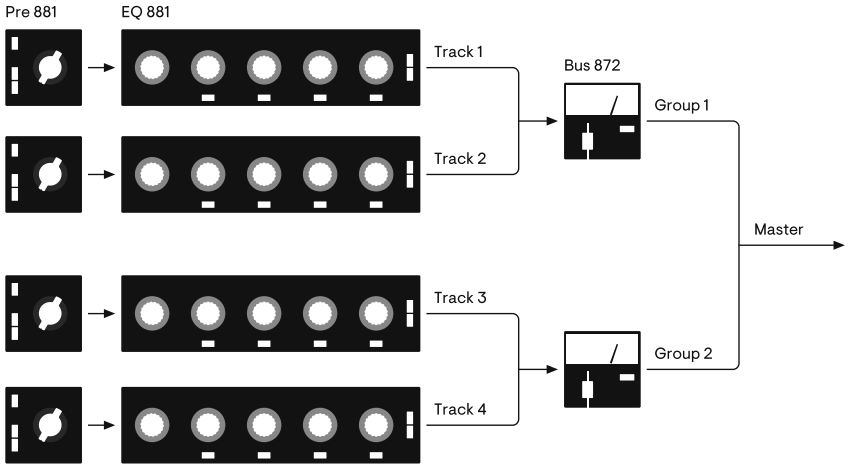
8014

Sixteen 1073 channels into four groups, the desk's 2254s on the groups.



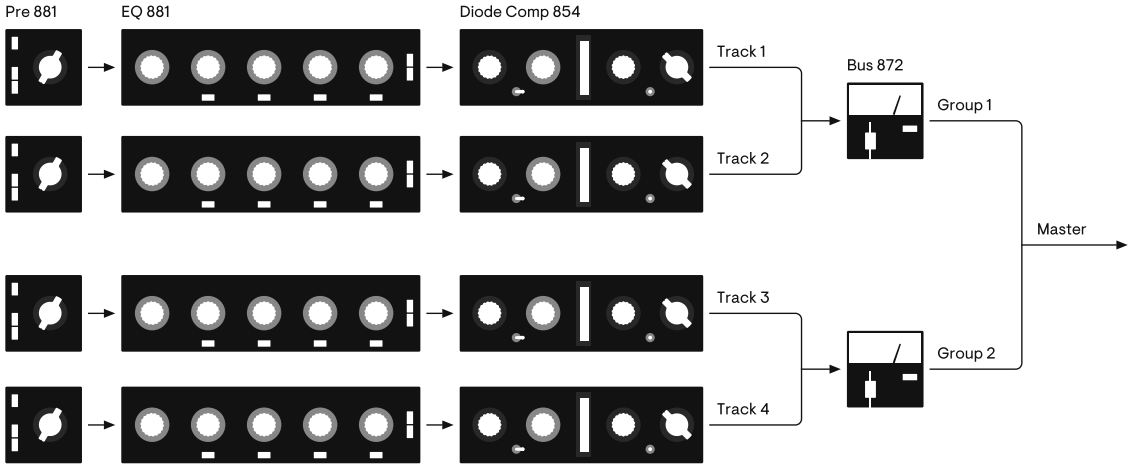
8048

Thirty-two 1081 channels into sixteen groups, 1974.

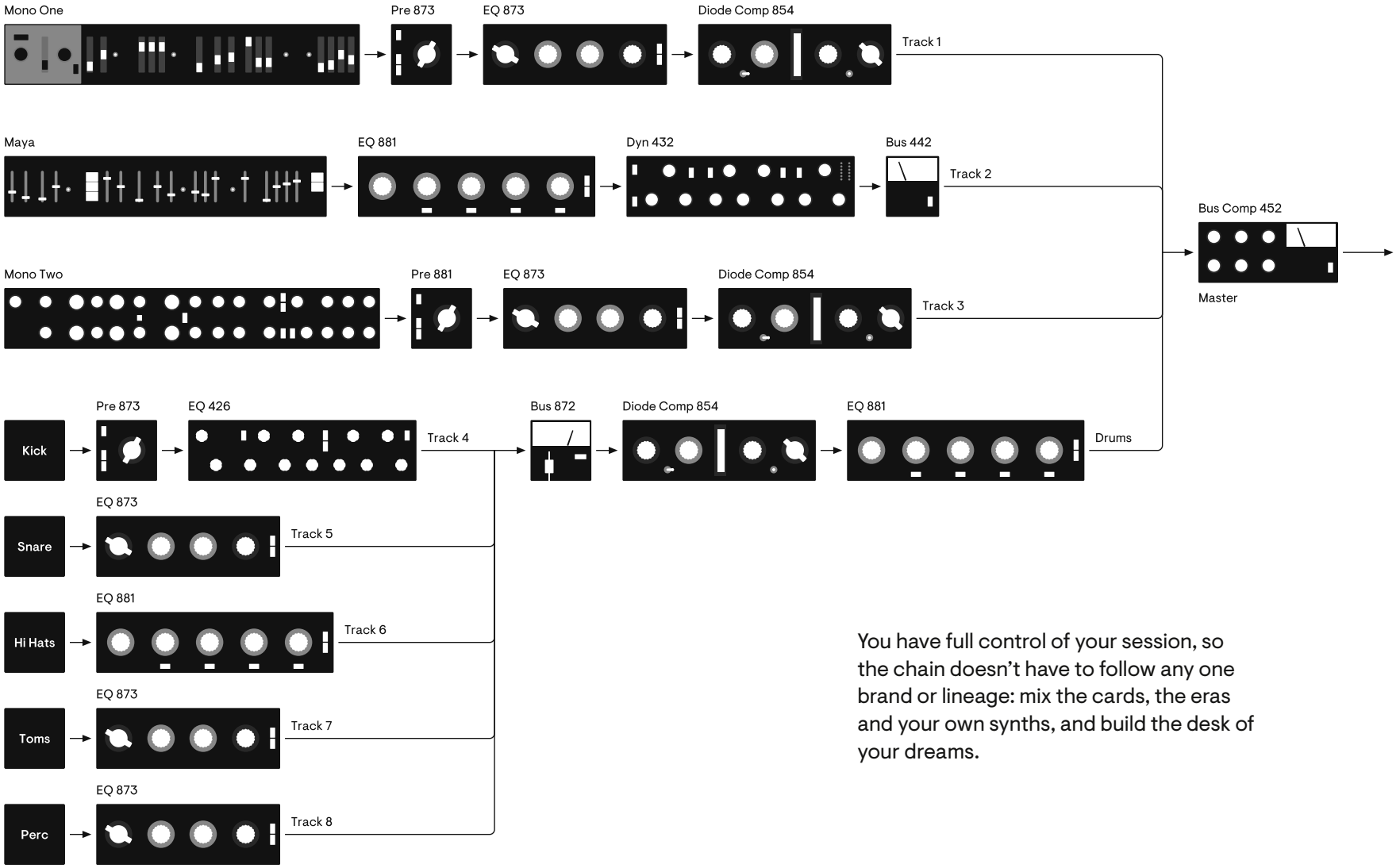


8038

1081 channels with the 2254/E on the channel insert.



YOUR DREAM DESK



You have full control of your session, so the chain doesn't have to follow any one brand or lineage: mix the cards, the eras and your own synths, and build the desk of your dreams.

Class A and Class AB

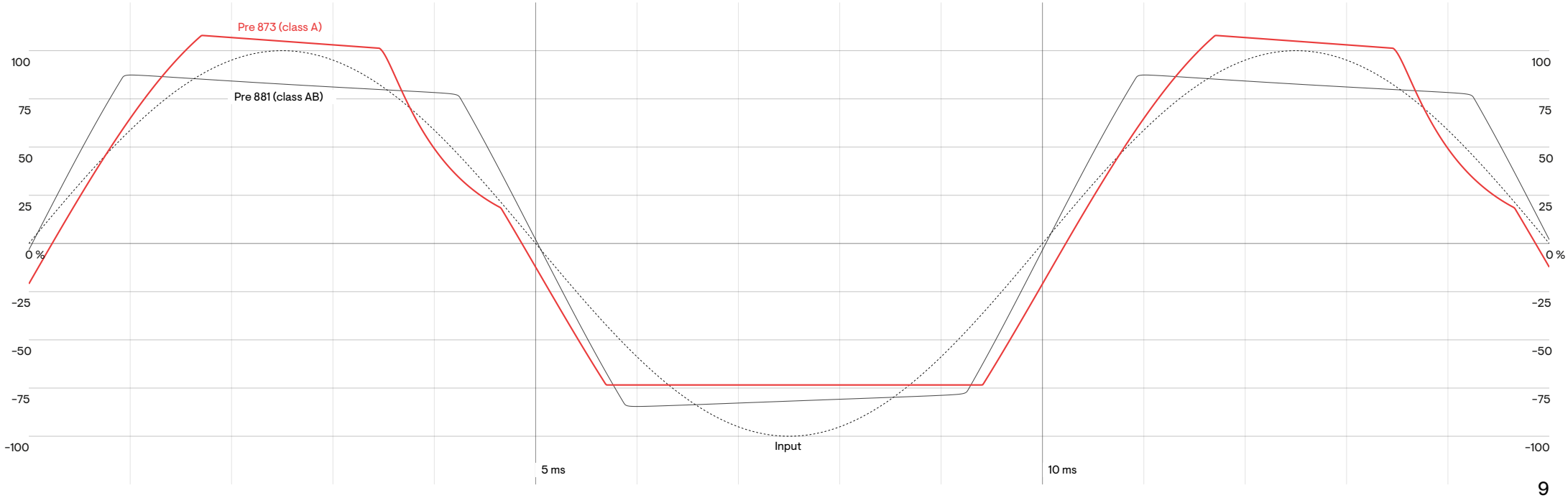
Over the years the factory produced a number of topologies to fit various standards, needs and environments. But arguably one of the biggest shifts happened when the company transitioned from class A amplification to class AB at the output of their modules.

In essence, in single-ended **class A** — a single power transistor and an output transformer carry the signal in both positive and negative direction, while in **class AB** — a pair is used: one for the positive side amplification and another for the negative side of the signal.

Each design has its value and drawbacks. In a single-ended setup in **class A** the one transistor has to handle both halves of the wave, and it treats them unequally. This introduces even-order harmonic content and produces more saturated sound.

In a push-pull pair of **class AB**, the saturation/clipping edge is higher (helped by a step-up output transformer) and with good implementation it should provide cleaner output. But push-pull design is also prone to some crossover distortion, even when the crossover transition is tuned well. Rupert Neve warned that the handover itself leaves high-order harmonics; Geoff Tanner, head of the factory's electrical drawing office, called the crossover distortion "teeny and inaudible unless you are nuts enough to drive the modules hard into clipping." Both devices let you hear for yourself.

Even though there were more topologies and designs, this suite provides models of two of the best-known preamp designs: Pre 873 models the class A design, while Pre 881 has a push-pull configuration in its class AB output.



Serial Numbers

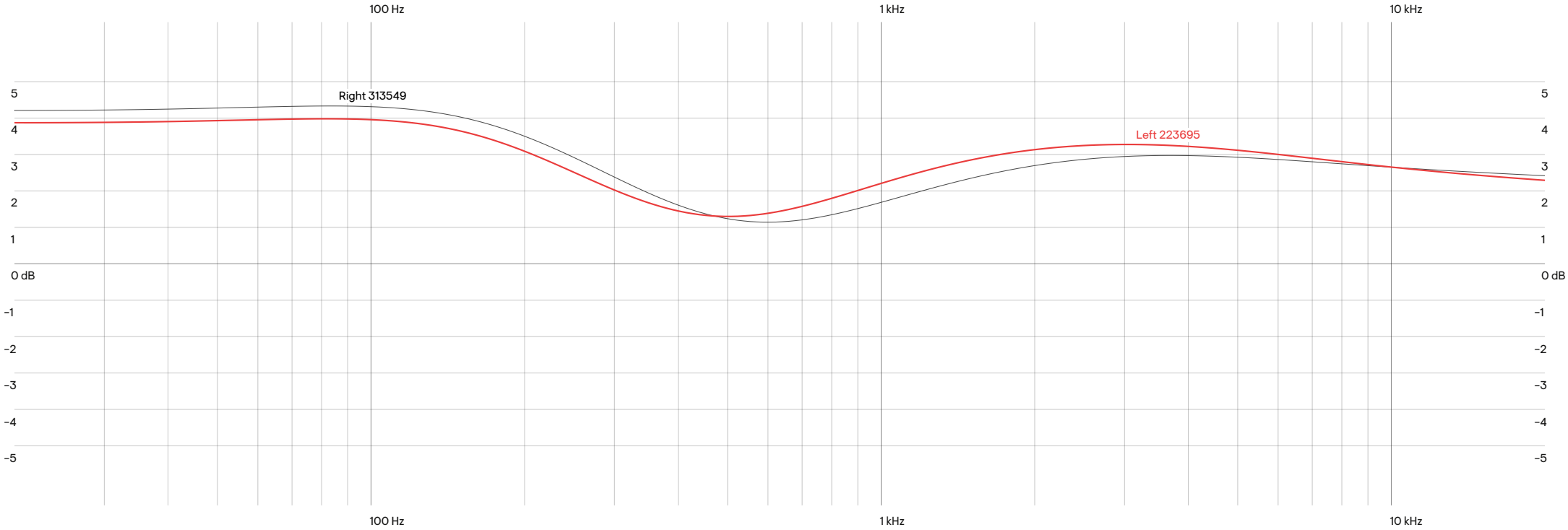
No two channels of a desk ever measured quite the same, and neither do two channels of Console 80. Every channel of every device is one unit, named by the six-digit serial number on its backplate.

The backplate, hidden under the device and revealed by clicking the Monomono logo in the corner, contains two serial numbers — the left and right unit.

The number is the unit's build sheet: it draws every part the way a production run would — the transformers, the output stage's bias setting, the inductors and the resistors and capacitors around them, the compressor's rectifier diodes and timing capacitors — each inside its factory tolerance.

Consecutive numbers come off the same batch and make a matched pair; numbers far apart draw from different batches and spread across the whole tolerance. Set Stereo gives you a random pair of consecutive numbers — best if you want some difference in performance while retaining mastering-level matching of the left and right channels. Fully random will provide unexpected differences in left and right processing, widening the stereo field and creating a bigger stage for the track.

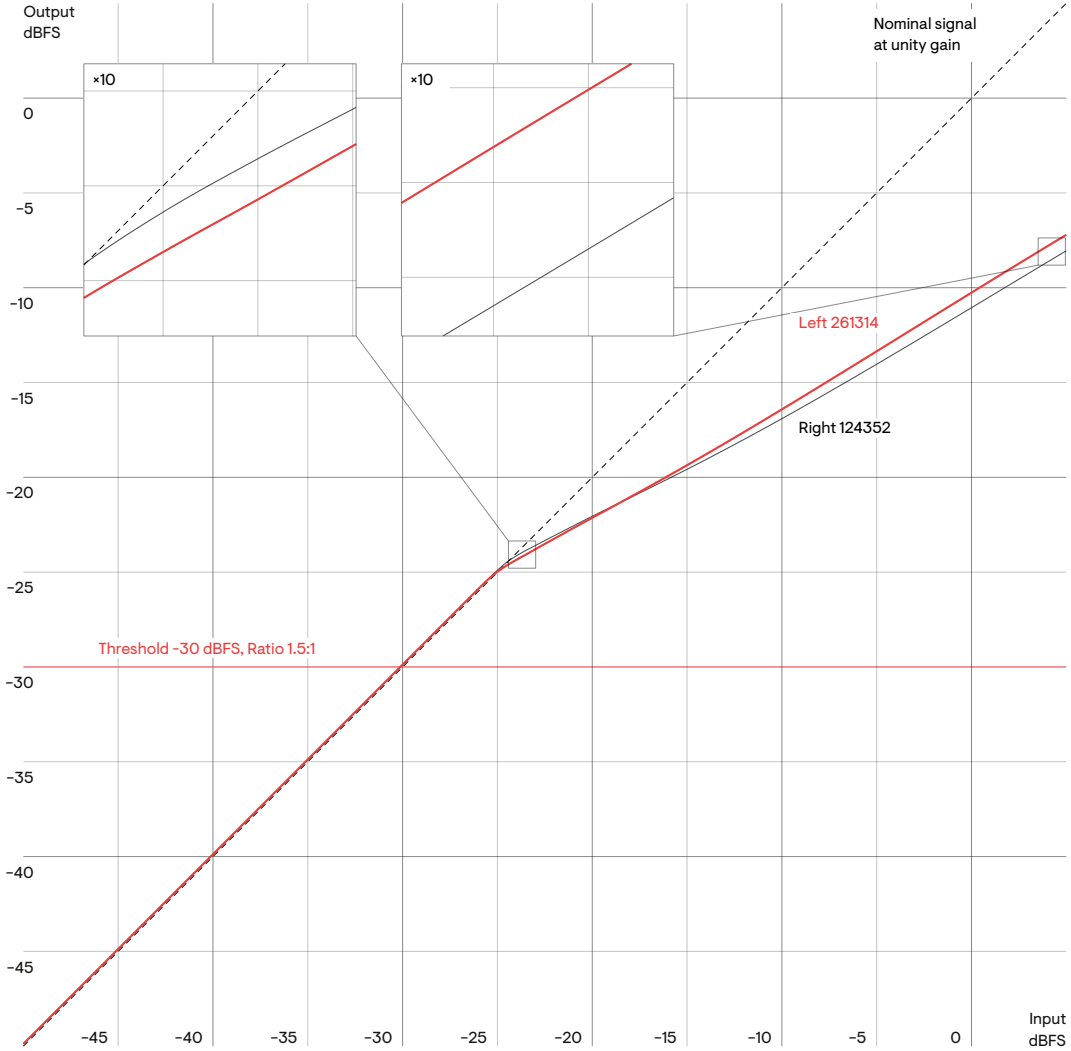
The differences are small on purpose: hundredths of a decibel between neighbors, a couple of dB between distant units at the extremes. Enough for a stereo pair that is not a clone — a little width, a little life — and for two instances that never sum identically.



Serial Numbers on Compressor

On a compressor, the difference lies in the dynamics. This example from the suite's Diode Comp 854 shows how the gain reduction curve can differ per channel.

Left starts compressing a little earlier but more gently; Right starts later and works harder, and by full scale the two have swapped places.





One of my favorite tricks when processing a mix, or even when mastering, is setting slightly different attack or release times on two compressors — often ones not particularly suited to master bus processing. For example, running the mix through a pair of 1176s, or my Comp-2A units (LA-2A clones from Golden Age), with just a bit of compression. The purpose wasn't even the compression itself, but to introduce a little difference into a mix that felt a bit digital and clinical. I've always felt there's a lot of space and width in just a bit of difference. Serials create exactly that — minor differences in the processing — like having a pair of units on every track.

As in my previous Monomono devices, this suite features the same trick, grounded in actual electronics and physics.

Pre 873 & EQ 873



The Legend

First drawn on 10 April 1970, it went into a London studio's desk that August — the company's first with 24 groups — and to this day the Neve 1073 preamp and EQ remains one of the most coveted designs for engineers, producers and artists. Vintage units are rare and sometimes appear on the market at prices only big studios can actually afford. Modern units, on the other hand, are sometimes said not to reach the heights of the older ones.

Looking at its anatomy, the unit is quite modest by modern standards: a fixed 12 kHz shelf, six presence points from 350 Hz to 7.2 kHz, four bass shelves and a four-step high-pass filter; the presence and bass frequencies sit on concentric switches with their gains on knobs inside them.

Under the hood, it's the recipe the factory had settled on in 1969. A transformer at the input, class A amplifier boards, a transformer at the output, all from one 24-volt rail. Rupert Neve came to 24 volts by way of lantern batteries, and to transformers because a low rail needs one to reach line level: "my friend the transformer", he called it. The output stage takes its feedback from the transformer's primary, which holds its low-frequency distortion down until the core runs out.

The 1073 was never one fixed circuit. By Geoff Tanner's count it went through more than twenty revisions, and the reputation came long after; at the time, its circuitry was "similar to the earlier units". What people came to hear in it — thicker bass, a top that stays smooth, a voice that moves to the front — grew out of that plain recipe, leaned on.

Pre & EQ 873

For convenience, and to save a little CPU in your sessions, the circuit is split into two devices, Pre 873 and EQ 873. Treat them as two halves of one whole.



THE COLOR

Pre 873 is where the 73's weight comes from: transformers and a class A output stage that thicken a signal from the bottom up. Drive takes back off what it puts in, so the level holds while the character grows. With material near −18 dBFS, up to +12 adds density without drawing attention, +18 gives bass and drums a growl, and +24 is an effect for guitars and synths.

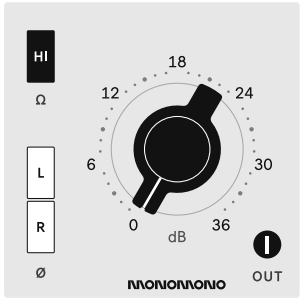
THE SHAPE

EQ 873 is the shaping half. It asks for few decisions: three bands and a low cut, every frequency on a switch, and curves broad enough that each position is a region rather than a point. Think in tone rather than surgery, how much low end and top end the mix calls for, and two or three moves on a few tracks often get you most of the way.

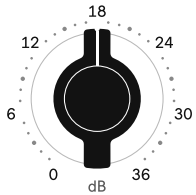
Boost more than you cut: the curves are forgiving, so a vocal steps forward without turning hard. Clear rumble with the Low Cut before you add weight with the Low shelf.

With every band off, it still softens the very top, as the original does with its EQ switched in. Output trims the level by up to 24 dB either way; the display draws your curve over the output's spectrum.

Pre 873



Pre 873 models the topology of the preamplifier section and is the color half of the circuit: its input transformer, preamp and output stage, with the EQ left to EQ 873. Run it first in the chain, dial drive to taste — drums may benefit from more drive since the transtients are short, trim the output to even out the signal.



DRIVE

From 0 to +36 dB. Drive pushes the whole circuit harder and takes the same amount back off at the output, so the level holds while the character grows: density first, then thicker bass and softened peaks, then grit: push the input, pull the output, built in. Past the point where it clips, the circuit gets no louder and the level dips a little, as on the hardware; the Output trim makes up for it. Input level counts too: 6 dB hotter in works like 6 dB more Drive.



MIC IMPEDANCE

HI or LO, the circuit's two input settings. HI, the default, carries a slight swell in the deep sub; LO trims the bottom octave instead and, with Drive up, adds a little more grit down low. A subtle change in weight, worth a try on bass and kick.



OUTPUT

A trim after everything else, ±12 dB, for matching against the untreated signal or making up the level the circuit gives away in clipping.



PHASE L / PHASE R

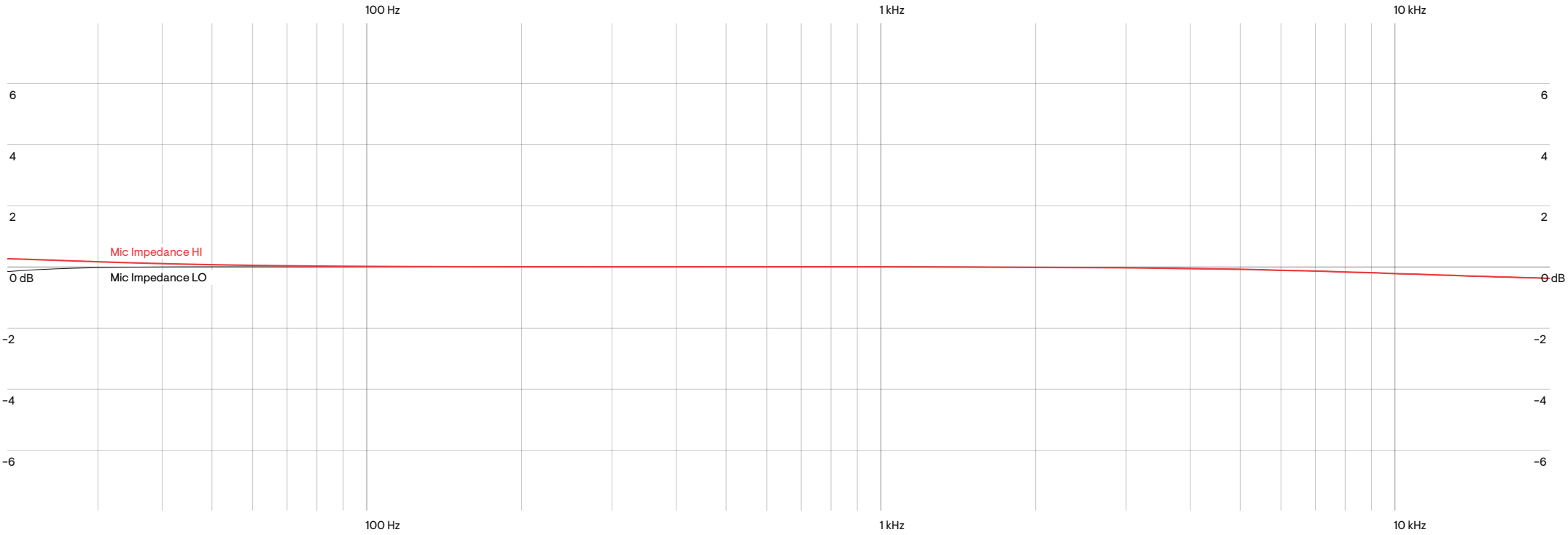
Flip the polarity of the left or the right side, as the PHASE button on the original hardware does. Handy for a stereo pair recorded out of polarity.

Frequency Response

Flat here is already a little flattering. Pre's frequency can generally be considered flat even by today's standards. Yet impedance causes a bit of shift which may make all the difference on the record.

High impedance brings the low end just a tiny bit up and while the frequency response shows a bit of divergence, main shift is happening in the harmonic content.

At low impedance the circuit works harder bringing more harmonic content to the signal. Both equaly valid and depend on the material and desired effect. HI for the fuller bottom, LO for a tighter one.



Harmonics

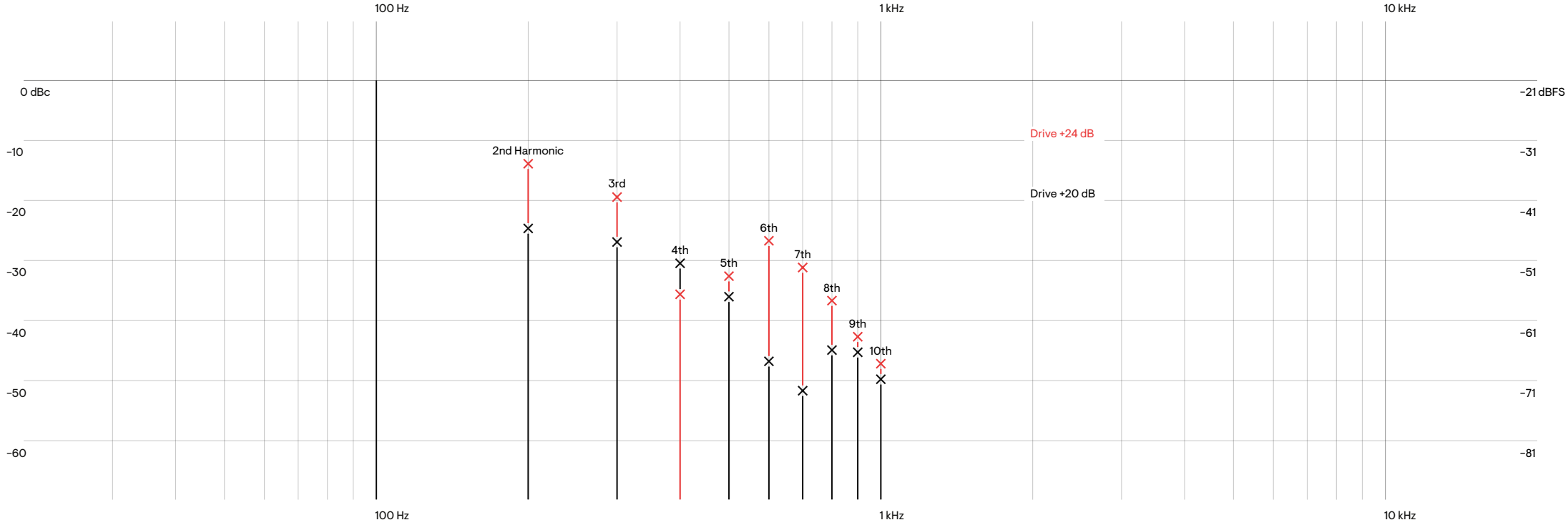
100 Hz at −18 dBFS, Drive +24 dB (+20 dB in black), Mic Impedance HI. Each cross marks a harmonic's level under the tone: −20 dBc is a tenth of it, −40 dBc a hundredth.

Overtones are why people run whole records through the 1073, and this is what Pre 873 actually adds to the signal.

A 100 Hz tone at −18 dBFS is pushed into clipping at two settings. At +20 the second and third harmonics sit side by side, at −25 and −27 dBc, and everything above them falls away fast: a thick, rounded distortion, more a texture than an effect, the kind you notice when you switch it off.

At +24 the second pulls ahead to −14 dBc with the third at −19, and the harmonics up to the eighth climb to between −27 and −37 dBc. That's where thickness turns to growl. On a vocal, stay at or below the lower setting for density that doesn't draw attention to itself; on bass, the higher one adds a growl that reads on small speakers; on a drum group it rounds the peaks before it does anything else.

Normalized samples and polyphonic synths, which usually run hot — close to −6 to 0 dBFS — don't need much drive for a pleasant saturation on top. If you're running the signal lower, +6 to +10 dB of drive can be used. More will send the signal into pure distortion.

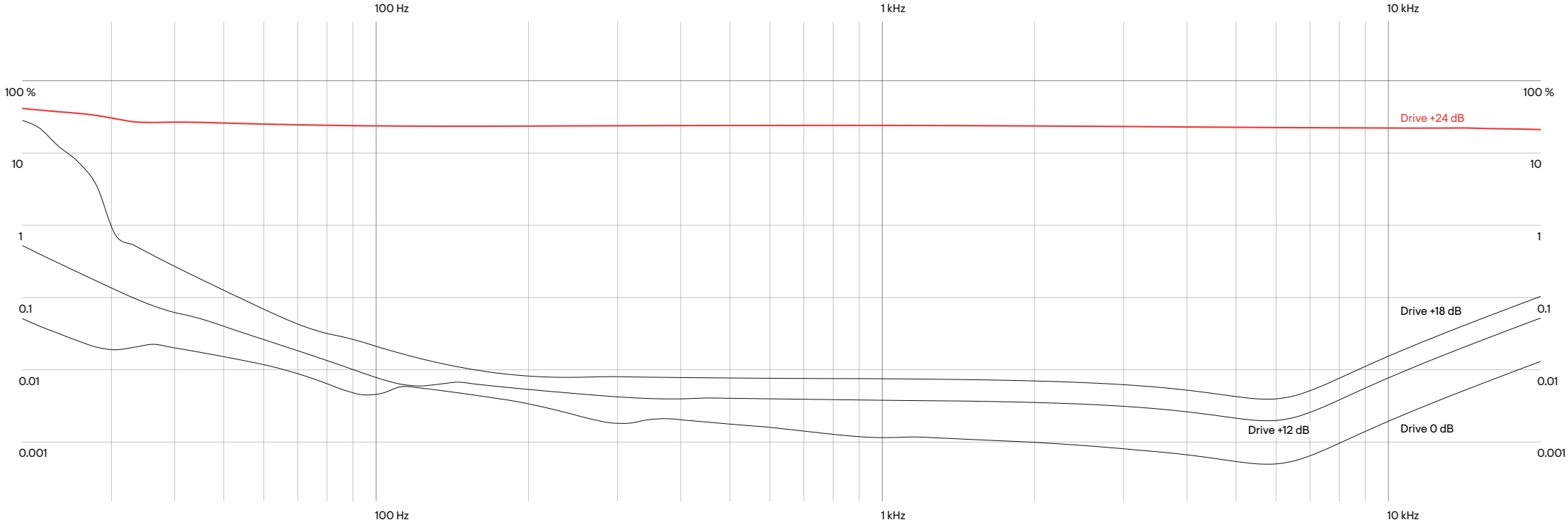


Distortion

Sine at −18 dBFS, Drive +24 dB, Mic Impedance HI. Higher means more distortion: at 1 % the added harmonics sit 40 dB under the tone, at 0.01 % 80 dB under.

The 873 gives way from the bottom up, and that is its character under Drive. A sine at −18 dBFS sweeps the band at four settings. At 0 the circuit is clean, about a thousandth of a percent through the mids. At +12 the mids stay clean while the bottom starts to stir, the first thickening under a bass. At +18 the lows break up, with only a barely audible crunch at 1 kHz — the bass grows a body while everything above it stays untouched. At +24 the whole unit clips across the range, more so in the deep lows, and that is the growl people put on bass.

As on the original hardware, the output stage and its transformer run out of room in the bass first. With material peaking near −18 dBFS, start busses between 0 and +12, try +18 on bass and drums that should growl, and treat +24 as an effect — great on guitars and synths in need of some distortion.



On the 1073 EQ



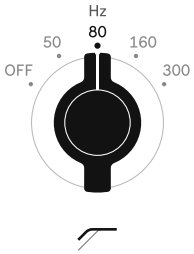
The 1073 EQ is very easy to underestimate, or even dismiss — just three bands, with the high shelf fixed at 12 kHz. But I'd say the secret to getting the most out of this simple setup lies not in learning it, but in adapting your thinking about the mixing process to what the 1073 offers.

I used to think of EQ as a sculpting exercise, and at times felt a bit guilty when the mix sounded good without me turning a lot of knobs and pushing a lot of buttons. That's what I get paid for, I thought. Yet with time I realized that by shaping the sound vigorously and aggressively, I had sometimes not only robbed the artists of their ideas, but also created more problems — details getting lost, grooves disappearing and vocals blending into the rest.

Gradually I started to think not in parts or instruments, but in tone — how much low end and top end the mix calls for. After a rough balance on the faders alone, the three bands of this fantastic EQ let me dial in exactly that. This way of thinking gets me halfway through the mix in minutes. Better yet, if I decide to reshape and rearrange the mix, it's not two dozen dials to take care of — it's maybe two to four, on specific tracks.

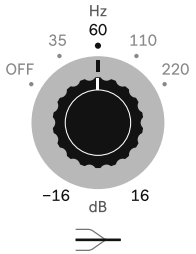
EQ 873 is a crucial tool in my setup, not because it sounds good (even though it does), but because of how quickly and seamlessly it lets me travel through the mix. I've never had the chance to work on a fully loaded vintage Neve desk — I can only dream of owning one someday — and I had a pair of modern 1073 units on my desk only for a few years while mixing commercially. It makes me wonder whether I'd love it as much if I had to deal with all the troubles vintage analog consoles bring. And something tells me that even if there were an audible gap between the real hardware and EQ 873, I would keep using the digital version, because the real luxury is the time you spend actually enjoying the mix and seeing artists happy — not chasing that gap.

Band Overview



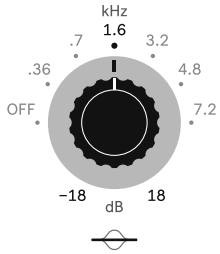
LOW CUT

A steep filter at 50, 80, 160 or 300 Hz, 18 dB per octave. The two lower steps clean rumble and handling noise; 160 trims boom and proximity effect; 300 thins on purpose.



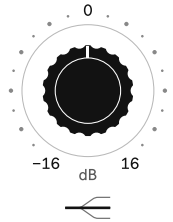
LOW

A shelf at 35, 60, 110 or 220 Hz, up to ±16 dB. The lower positions put weight under a kick or a bass; 220 Hz reaches into the low mids and thickens the whole bottom half.



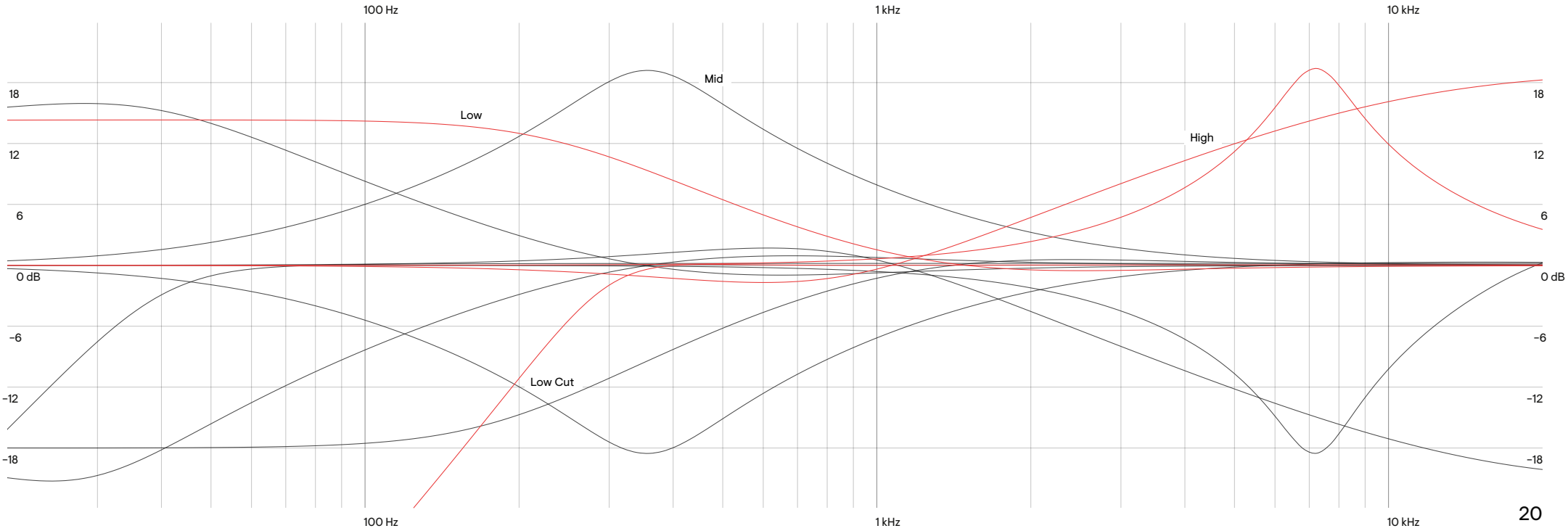
MID

A bell at 0.35, 0.7, 1.6, 3.2, 4.8 or 7.2 kHz, up to ±18 dB, broad low down, tighter at the top. 0.35 and 0.7 are body, 1.6 and 3.2 bring a voice forward, 4.8 and 7.2 are edge on guitars and cymbals.

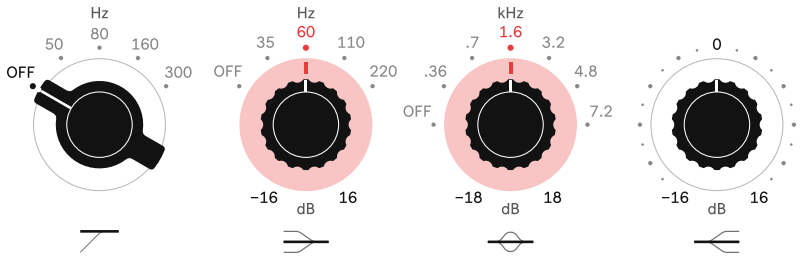


HIGH

A shelf fixed at 12 kHz, up to ±16 dB, halfway up by 3.5 kHz. A few dB opens a vocal or overheads; it stays pleasant well past too far, so watch it. Turned down it takes the glare off cymbals and bright guitars.

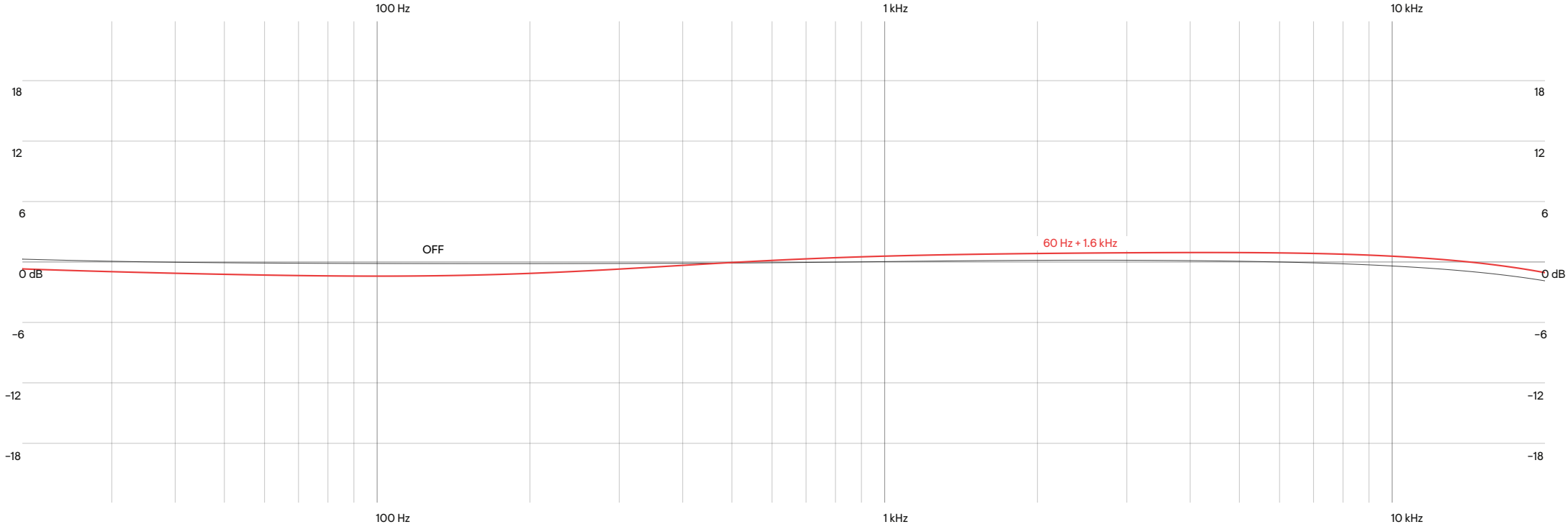


Frequency response with no gain

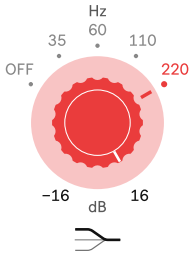


The EQ shapes the signal slightly even when the gain dials are set to 0, as soon as a frequency is selected. Selecting a frequency switches that band's circuit into the signal path, and at 0 it doesn't cancel out completely.

If you notice the response changing with no gain applied, it's not a bug: it comes from the original circuit, which EQ 873 follows.

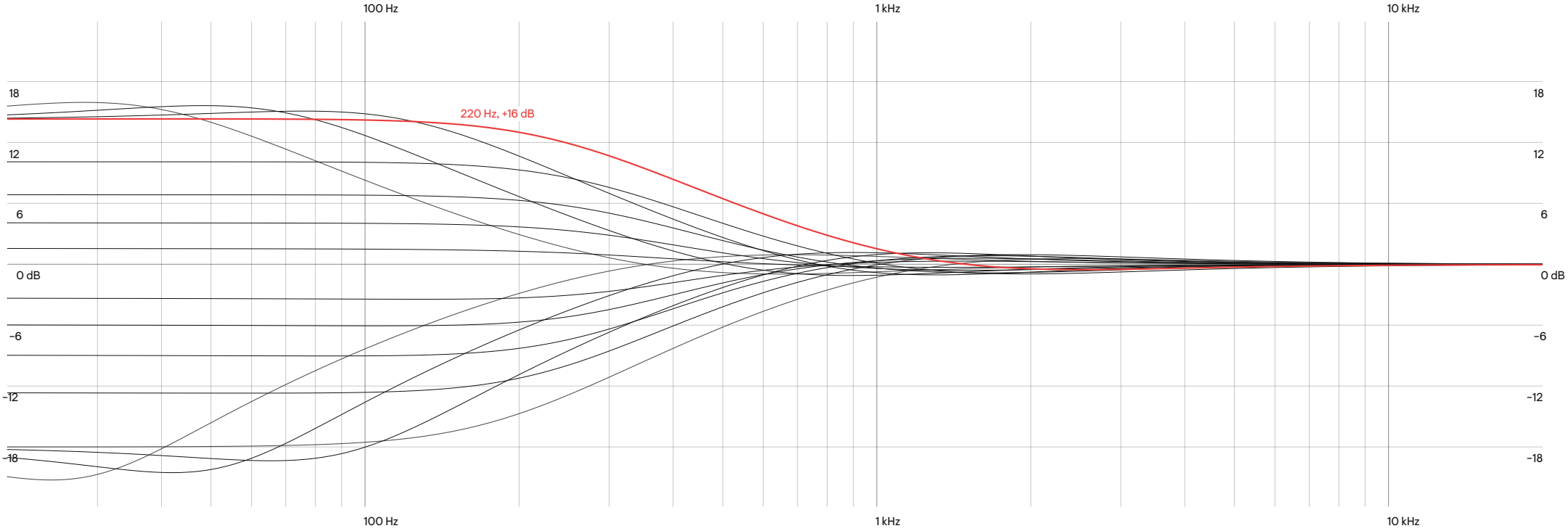


Low Frequency Band

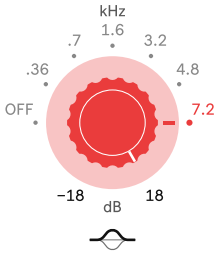


The band that made the EQ the first call for kick and bass. Notice how wide and gentle the curves are: at 220 Hz the shelf reaches well into the mids, and at higher boost settings it even dips slightly just above that, around 2 kHz.

Soft, gradual curves were the norm on consoles of the time, set as much by the circuits — inductors and fixed, switched frequencies — as by taste. Sharper sculpting arrived soon after: sweepable and parametric EQ in the early ’70s, and the factory’s own Hi-Q button in 1972.

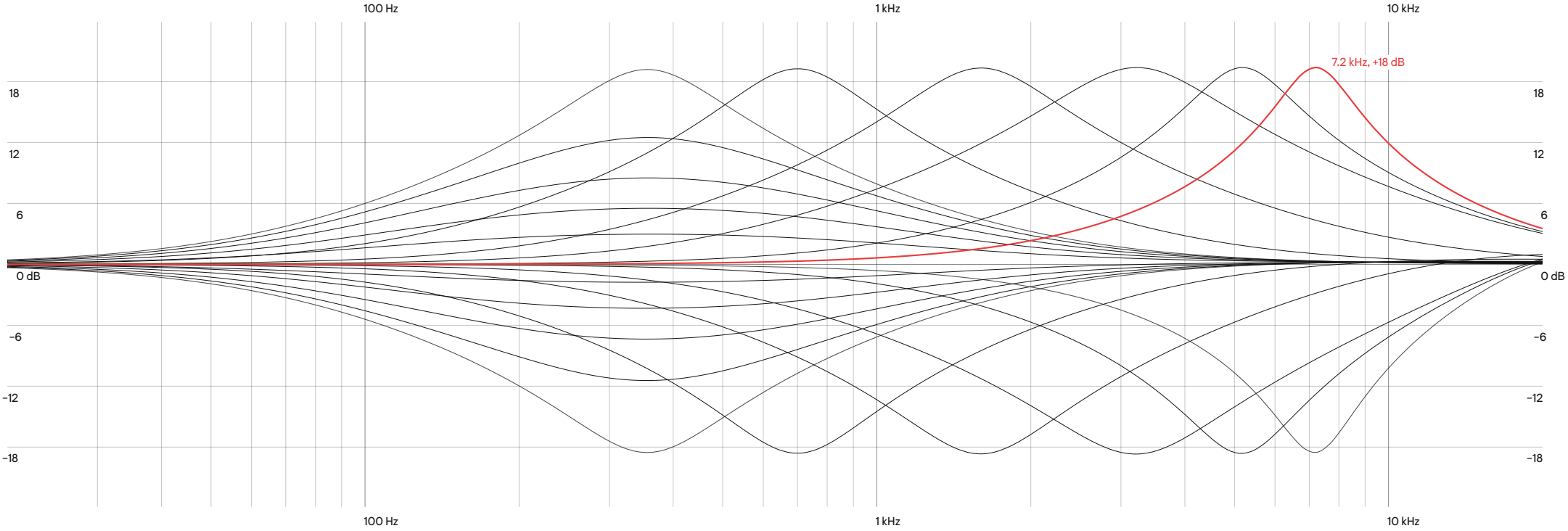


Mid Frequency Band

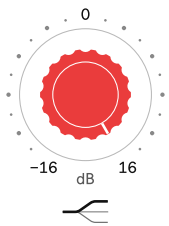


Six points, and one of them is nearly always right for the material.

The bell is narrowest at the top, a focused lift for edge on vocals, guitars and cymbals, and widens as it goes down: at the low points it moves the whole body of a thin snare or a small guitar, and a cut there clears boxiness. The middle points are where a vocal steps to the front and a snare cracks, and the bell stays smooth there even pushed hard, so boost rather than cut. Like Low Gain, Mid Gain saves most of its lift for the last stretch of the knob.

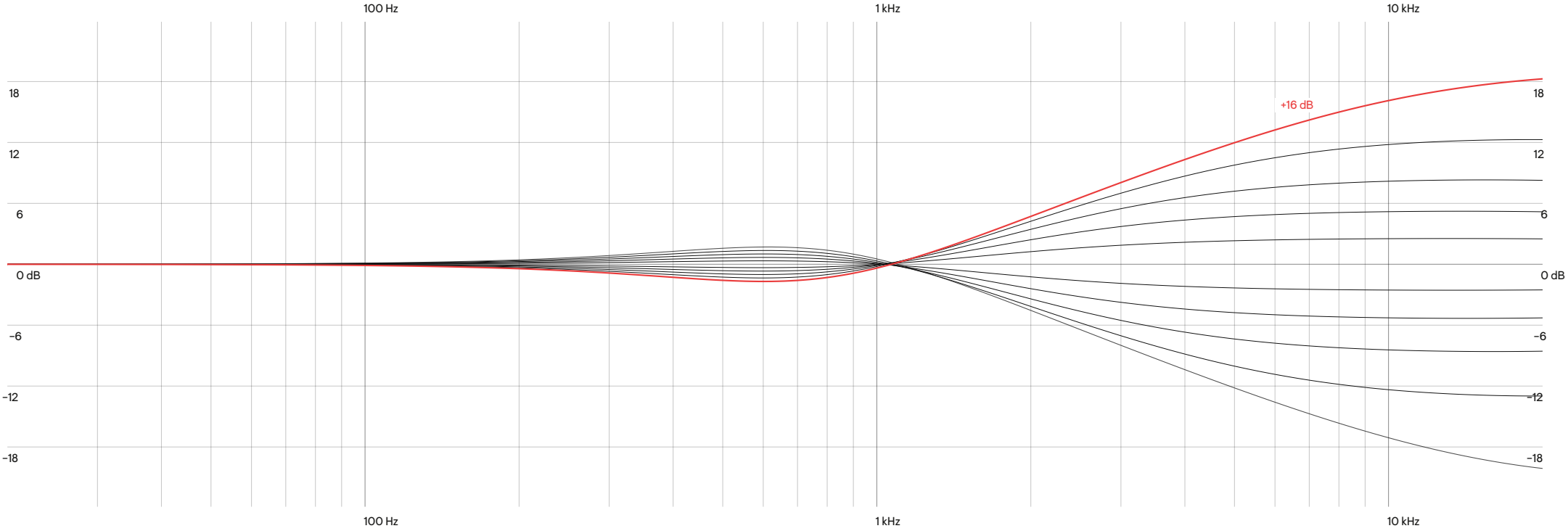


High Frequency Band

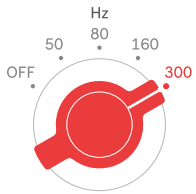


One shelf, one frequency, the lift a lot of people check for first, including the guy behind this manual.

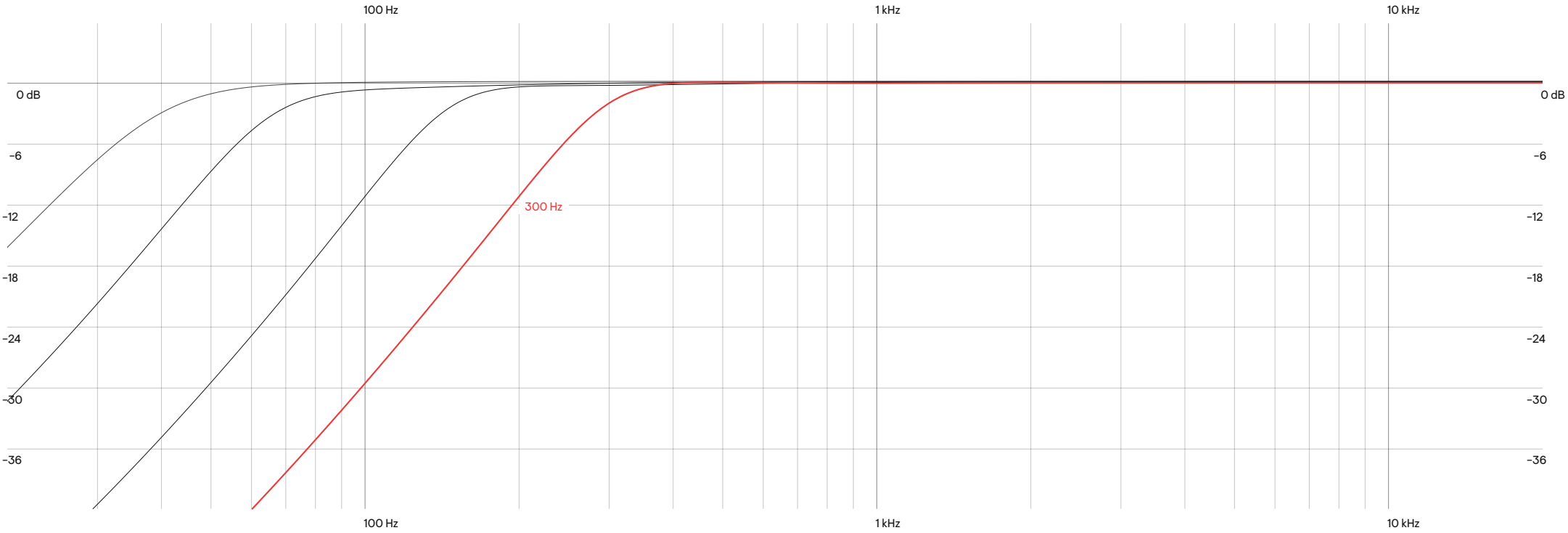
It starts rising well below its 12 kHz marking, so a full boost brightens the whole upper range. A few dB opens a vocal or overheads, and on a kick it brings out the beater. It stays pleasant even at its extremes, which makes it easy to overdo. Turned down, it takes the glare off harsh cymbals and edgy guitars.



Low Cut Filter



The one place on this EQ where people cut without a second thought. The top step thins backing vocals, pads, acoustic guitars or a hi-hat mic; lower down it clears boom and proximity effect, then rumble and handling noise, and at the bottom step only the deepest sub. The knee is firm with no bump above it, so it cleans without adding a resonance. It pairs with the Low shelf: rumble out here, weight back in there.



Pre 881 & EQ 881



The Big Shift

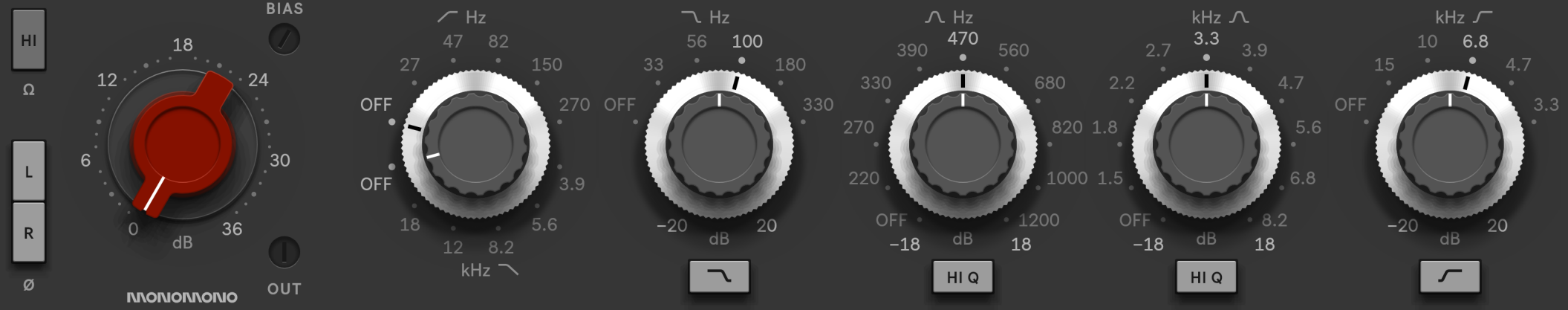
The 1081 was drawn in 1972 for one desk, a studio in Paris; the desk's drawings began that July and it arrived at the start of 1973. Its forerunner, built that year for a London customer, had already put the frequencies on printed concentric rings and both filters on one switch at the foot of the panel. The 1081 kept that face and went to four bands: shelves that turn into peaks, two presence bands with ten positions each and a Hi Q button, and a high-pass and low-pass filter of 18 dB per octave. Where the 73 asked for broad strokes, the 1081 put a bell exactly where a problem sat.

It was built differently too. Instead of the 1073's larger boards, it used a family of small plug-in amplifiers on one motherboard: five for the preamp and the equalizer, two buffers for the filters, and a class AB output board with its own bias trim. It drew 210 mA where a 73 drew about 120, and the factory promised no more than 0.01 % distortion at +20 dBm: the figures behind its cleaner, tighter reputation.

Most of the 8048 desks left the factory fitted with it. In 1975 one customer had the 1081 modified, marked by a gold label on the back of each module; its presence bells came out narrower and hotter. Pre 881 and EQ 881 follow that gold-label 1081.

Pre & EQ 881

As with the 873 pair, the circuit is split into two devices for convenience, Pre 881 and EQ 881. Treat them as two halves of one whole.



THE COLOR

Pre 881 has a cleaner, tighter character than Pre 873. Its push-pull class AB output stays clean longer, then turns quickly into hard crunch, and it adds edge rather than weight. Choose it for busses that should stay clean, for synths and for parts that have to cut through; choose Pre 873 when you want thickness. Bias starves the output stage for a grainy edge in the top.

THE SHAPE

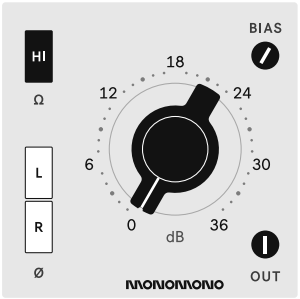
EQ 881 is the precise sibling. Where EQ 873 paints in broad strokes, it puts a bell exactly where a problem sits: four bands, ten positions in each presence band, Peak buttons that turn the shelves into bells, and Hi Q for a narrower, stronger bell.

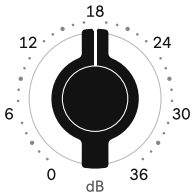
With Hi Q off the presence bands shape tone; with Hi Q on and the gain down they pull out a single harsh ring. Peak turns the Bass into a bell that leaves the sub alone. The two filters share one control and clear rumble below and hiss above.

The device follows a factory-modified 1081 whose presence bells are narrower and hotter than the standard issue. Output trims the level by up to 12 dB either way; the display draws your curve over the output's spectrum.

Pre 881

Pre 881 models the preamplifier section of the four-band circuit, with its class AB output stage. Next to Pre 873 it's the cleaner, tighter one: it stays clean longer, then stops quickly, and adds edge rather than thickness — for busses, synths and anything that has to cut through.







DRIVE

From 0 to +36 dB. Drive pushes the whole circuit harder and takes the same amount back off at the output, so the level holds while the character grows: a long clean stretch, then a quick turn into hard crunch. Past the point where it clips, the circuit gets no louder and the level dips a little, as on the hardware; the Output trim makes up for it. Input level counts too: 6 dB hotter in works like 6 dB more Drive.

OUTPUT

A trim after everything else, ±12 dB, for matching against the untreated signal or making up the level the circuit gives away in clipping.



BIAS

The output amplifier's idle-current trim. At 0 % it sits at the factory setting and the stage is clean. Turning it up starves the stage: loud passages grow a brittle, grainy edge in the top end, with the level untouched. The last stretch of the travel does most of it.



MIC IMPEDANCE

HI or LO, the input transformer's two strappings. On this circuit the switch is worth less than its name suggests: LO takes a shade off the lowest octave and, with Drive up, adds a little third harmonic in the bass. Level is matched either way.



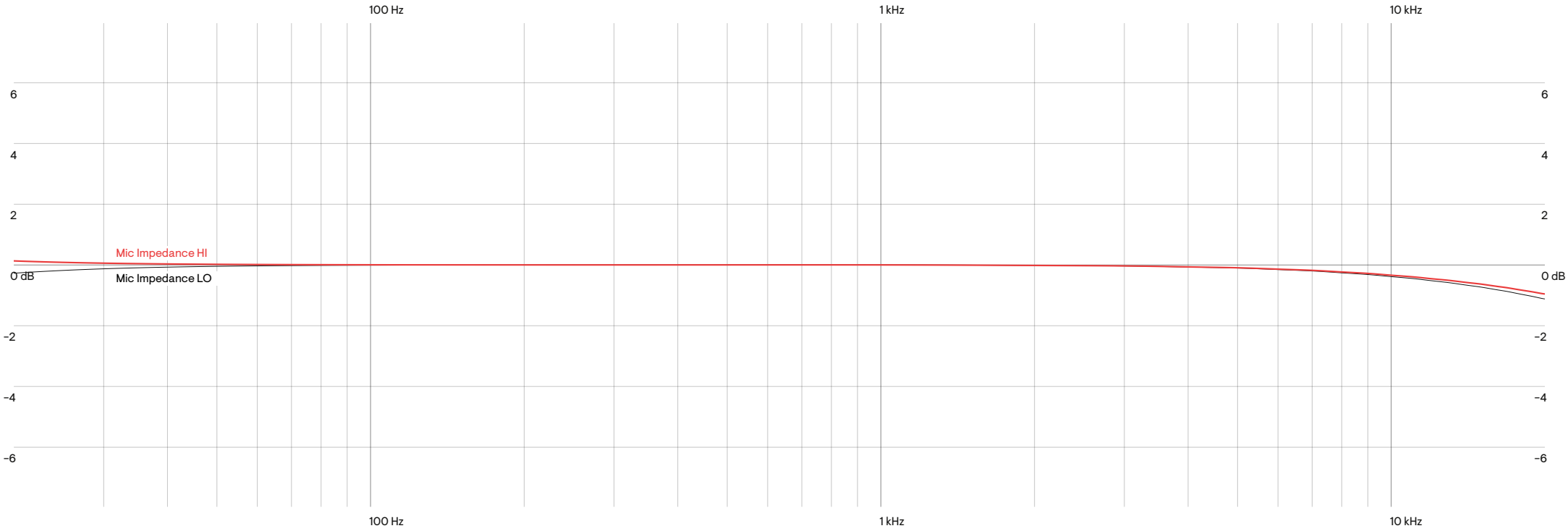
PHASE L / PHASE R

Flip the polarity of the left or the right side.

Frequency Response

Mic Impedance HI, Drive
0 dB, small signal.

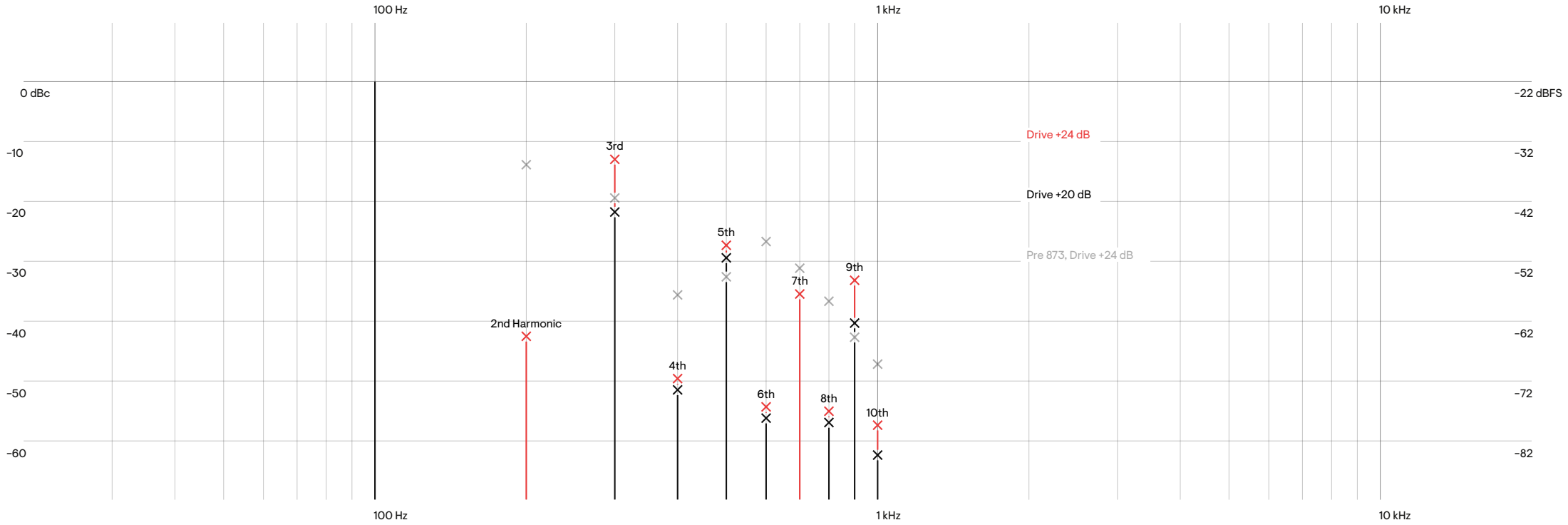
Pre 881 at its default — Mic Impedance HI, Drive at 0, a quiet signal — is flat through the middle and eases off at the top, 0.3 dB down at 10 kHz and about 1 dB at 20 kHz: a shade softer than Pre 873, the gentle top octave of the circuit's output stage, and part of why this circuit reads as clean rather than bright. At the bottom it rises instead, +0.1 dB at 20 Hz and +0.6 dB at 10 Hz, and keeps climbing below hearing, so rumble passes through untouched; the High Pass in EQ 881 takes care of that. Switch to LO and the circuit matches HI from about 50 Hz to 11 kHz and bends away at both ends: −0.3 dB at 20 Hz, −0.8 dB at 10 Hz, 1.1 dB down at 20 kHz. HI for the fuller bottom, LO for a tighter, slightly darker one.



Harmonics

Where Pre 873 thickens, Pre 881 hardens, and the faint crosses show why. Pre 873's single-ended output clips one side of the wave first, so its strongest harmonic is the second, an octave above the note: it blends in and makes the sound fuller. Pre 881's push-pull output clips both halves alike, so the second barely appears and the odd ones lead, the third and the fifth, which read as edge and grit rather than weight.

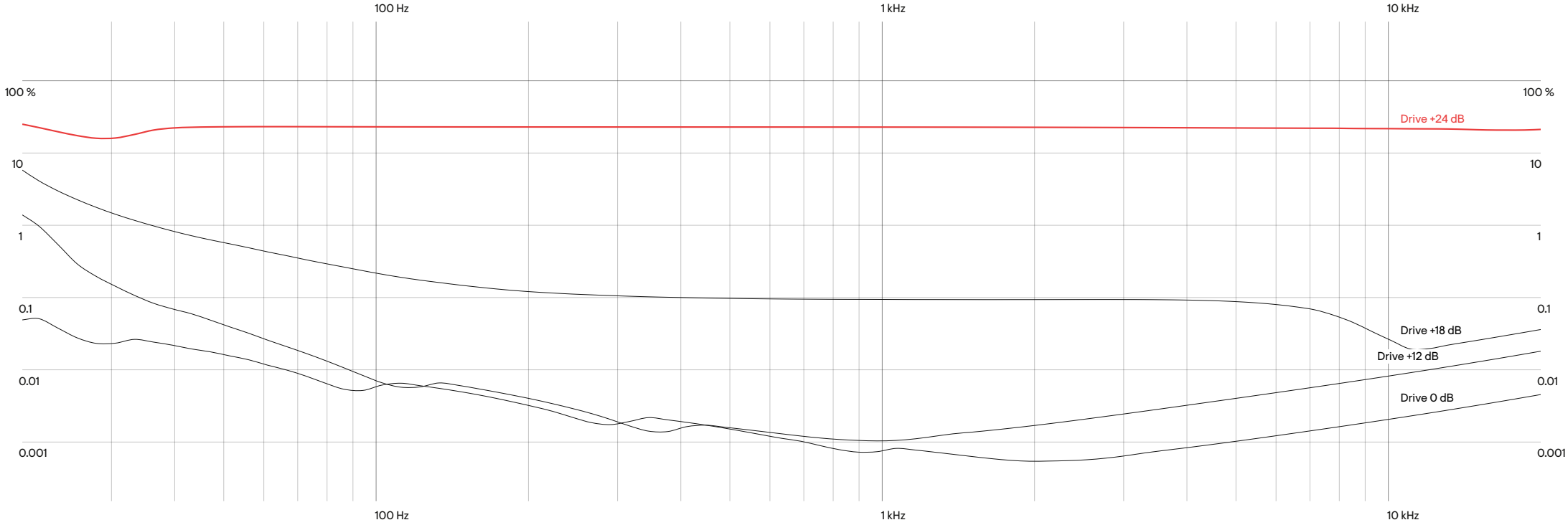
Push it harder and the odd harmonics climb together into a hard, dense distortion. On drums it adds crunch without blur; on a bass that has to cut through, it's a growl with teeth. For thickness rather than edge, reach for Pre 873.



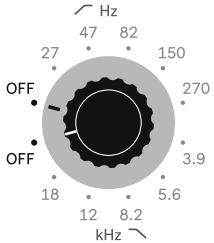
Distortion

Sine at −18 dBFS, Drive +24 dB, Mic Impedance HI. Higher means more distortion: at 1 % the added harmonics sit 40 dB under the tone, at 0.01 % 80 dB under.

This circuit keeps its composure longer than the 1073 and then gives up all at once, which is what people mean when they call it tight. A sine at −18 dBFS sweeps the band at four Drive settings. At 0 it's exceptionally clean, under a thousandth of a percent through the mids and 0.05 % at 20 Hz. At +12 the mids stay there while the bottom stirs: 1.4 % at 20 Hz, a first firmness under a bass without a trace of it higher up. At +18 the mids reach a tenth of a percent and the bottom 6 % at 20 Hz; 6 dB more and the whole circuit is clipping, 22 to 25 % from the bass to the top. It stays clean, then gives way at once. As on the original hardware, the transformers' iron runs out first at the very bottom. With material near −18 dBFS, start busses between 0 and +12, use +18 for a trace of grit on bass and drums, and treat +24 as an effect.

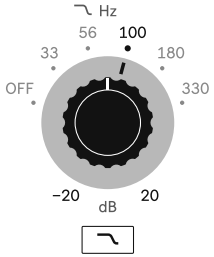


EQ 881 at a Glance



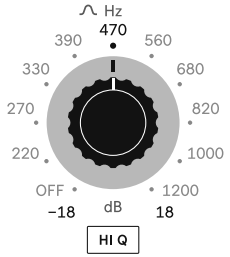
FILTERS

Rumble out below, hiss out above, both on one control.



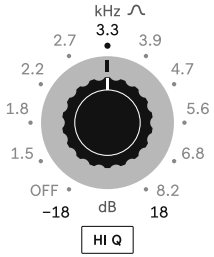
BASS

Weight under everything, reaching into the low mids at the top. Peak turns it into a bell that leaves the sub alone.



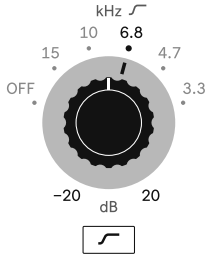
LOWER PRESENCE

Body, boxiness and honk. Hi Q narrows it: off for tone, on for surgery.



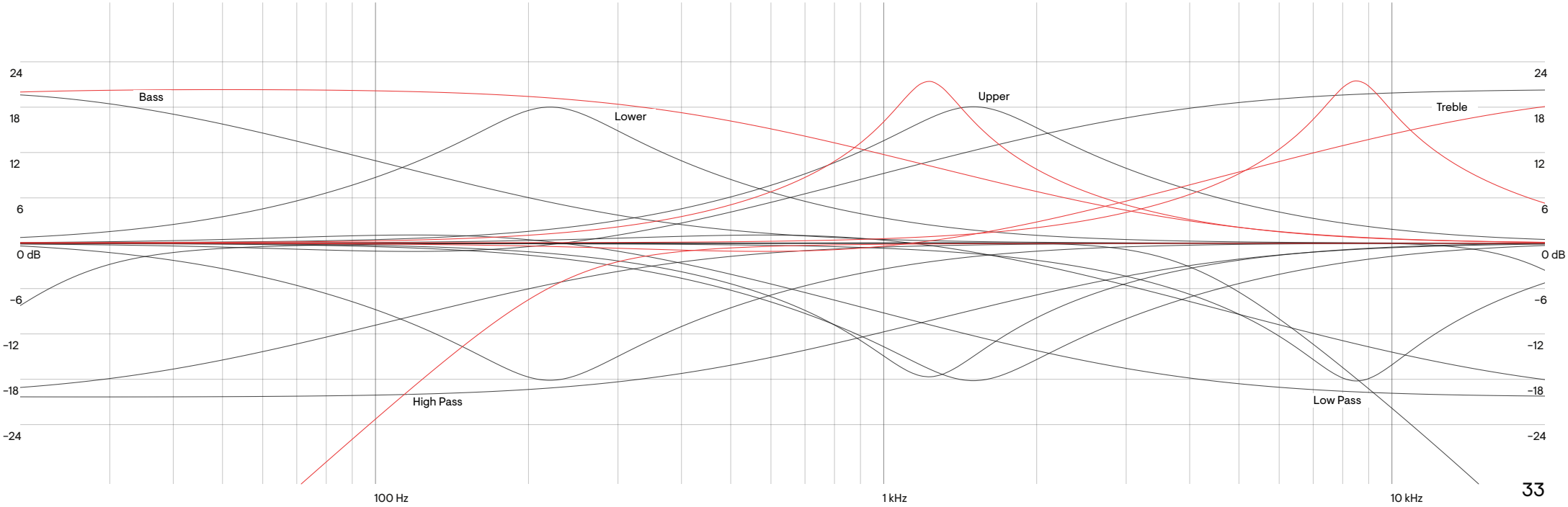
UPPER PRESENCE

Forwardness low down, edge at the top. With Hi Q and the gain down it pulls out one harsh ring.

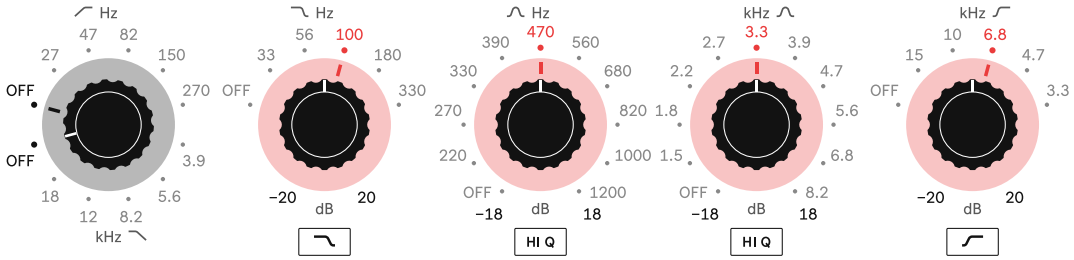


TREBLE

Brightness that starts well below its marking. Peak lifts the top octave alone.

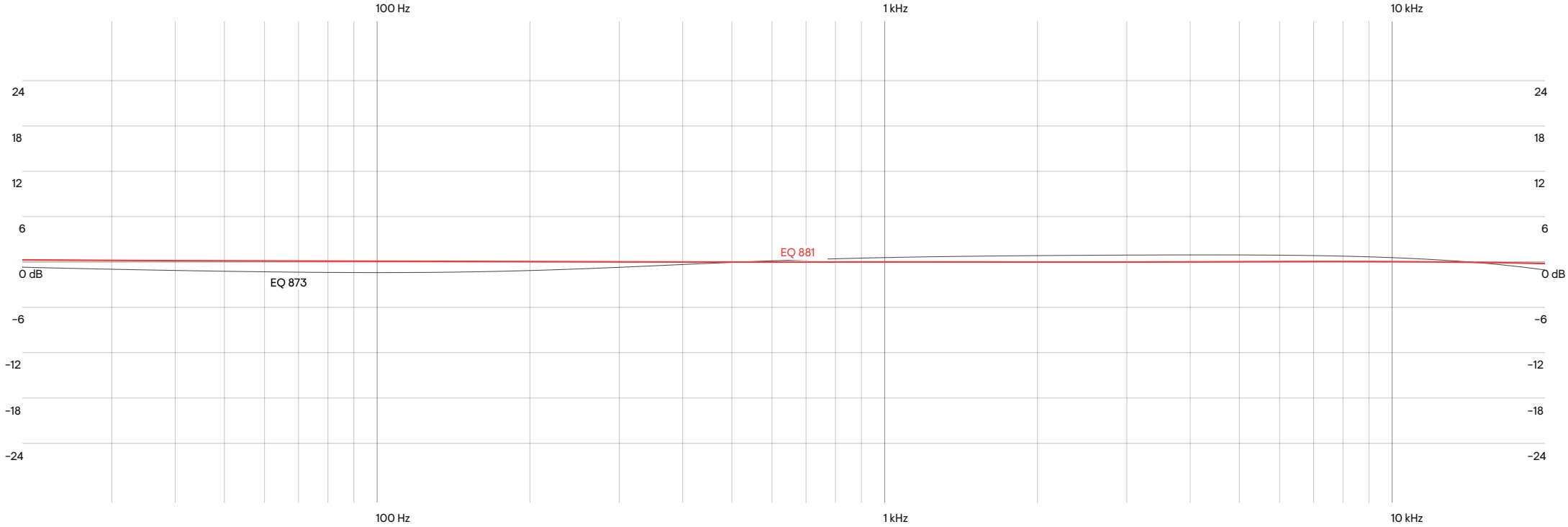


Frequency response with no gain

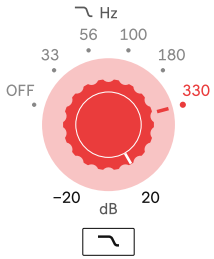


Unlike EQ 873, this EQ leaves the sound alone when a frequency is selected with the gain at 0: every band can be switched in without changing anything.

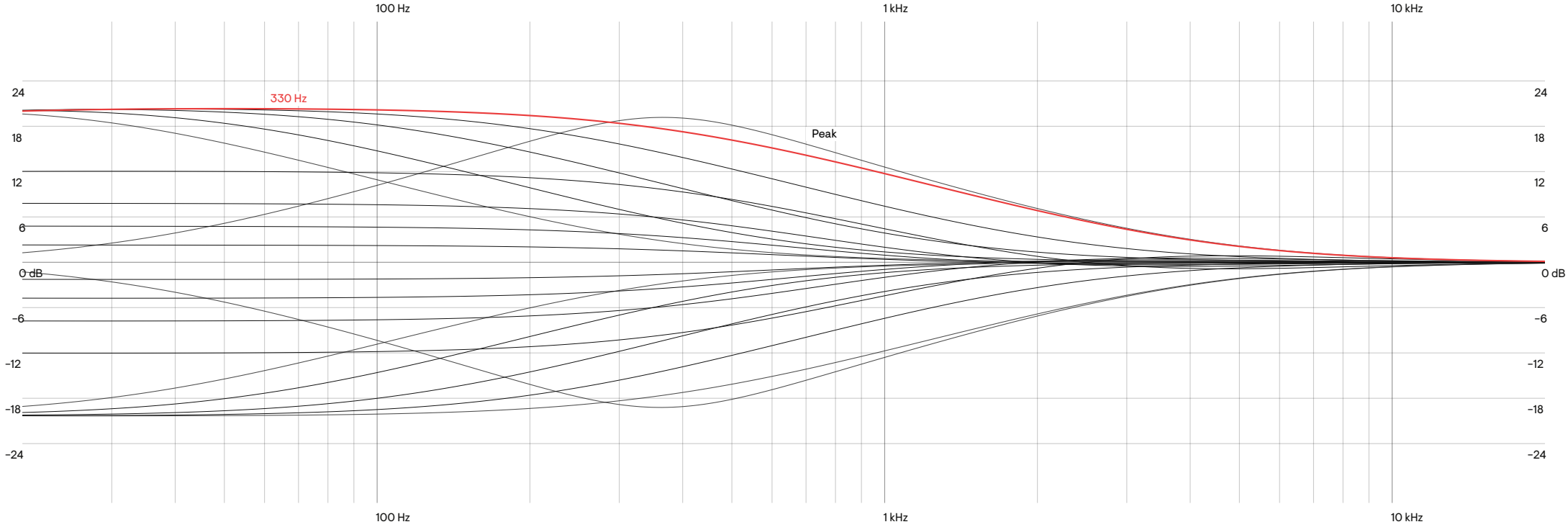
Each band here is its own amplifier stage, with the gain control balanced around its center, so at 0 the boost and cut sides cancel out across the whole range. On the 73 circuit the Low band's network isn't balanced at the center once a frequency is selected, and the Mid stage stops canceling at the very top, hence its slight dip in the bass and lift in the highs.



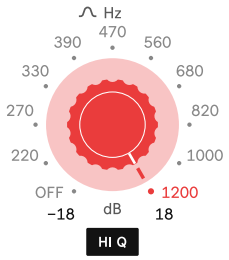
Bass



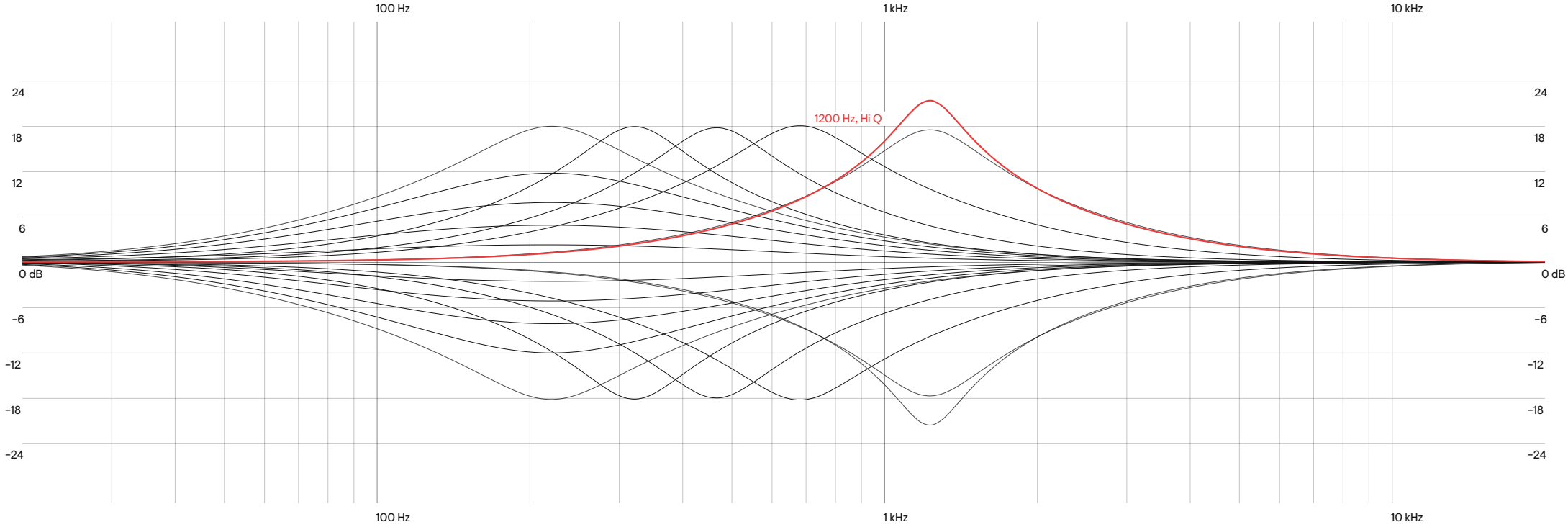
Weight on this EQ is firmer than on the 73, and it comes in two shapes. As a shelf, the top position reaches far up into the low mids, the lift that fills out a thin electric guitar, while the low positions put weight under everything without a bump. Press Peak and the shelf becomes a bell: at the lower positions that's kick thump without the rumble beneath.



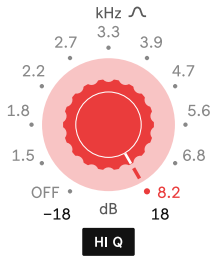
Lower Presence



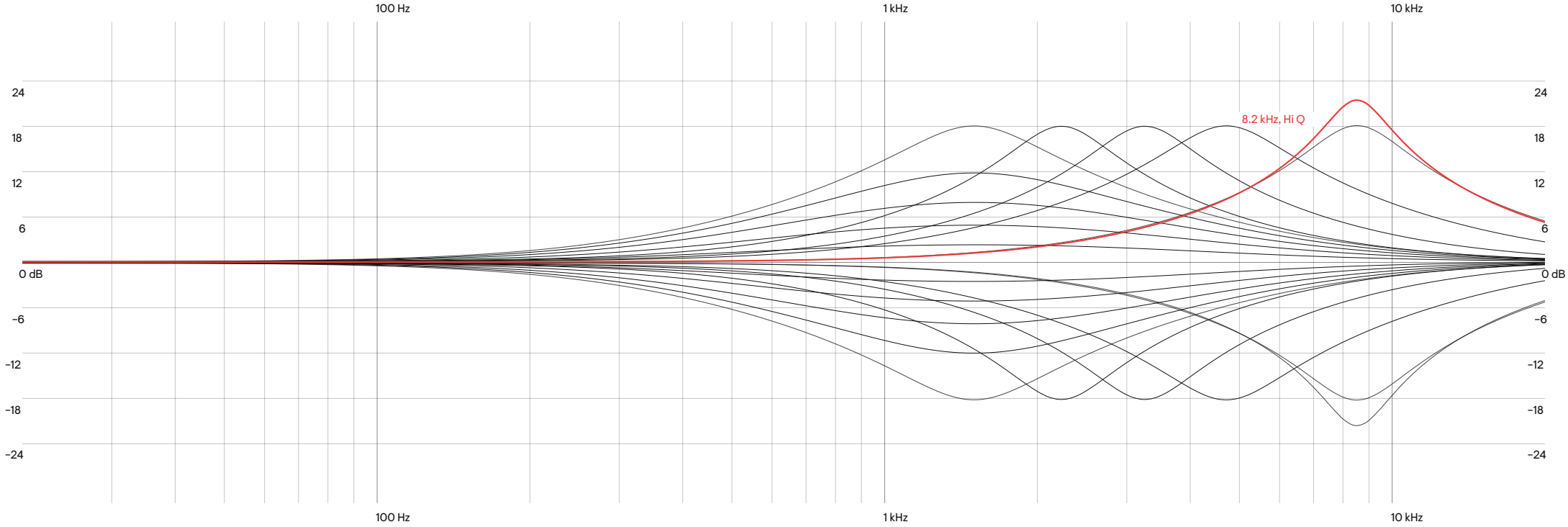
This is where the 81 earns its name for control. With Hi Q pressed the bell is narrow enough for the snap of a snare or the nasal part of a voice, and just as precise turned down, when one boxy note in a guitar has to go. Even without Hi Q it's tight: the original this device follows was modified at the factory for one customer in 1975, marked with a gold label on the back, and its presence bands came out narrower and hotter than the standard issue. At the lowest positions the bell is at its widest: cut there to clear boxiness, or boost for body on a thin guitar. Higher up it finds honk and forwardness.



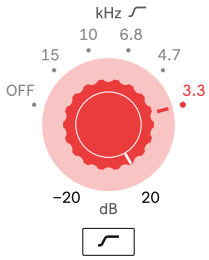
Upper Presence



Bite lives here, and so does the fix for too much of it. At the top position with Hi Q it brings out cymbals, acoustic guitars and the top of a voice, and with the gain down it pulls a harsh ring out just as precisely, the move that saves a harsh guitar track. At the bottom the bell is at its widest: forwardness for a vocal that needs to step out, or a guitar that needs to cut through. In between is presence and edge, where a snare cracks and a voice turns hard if pushed.

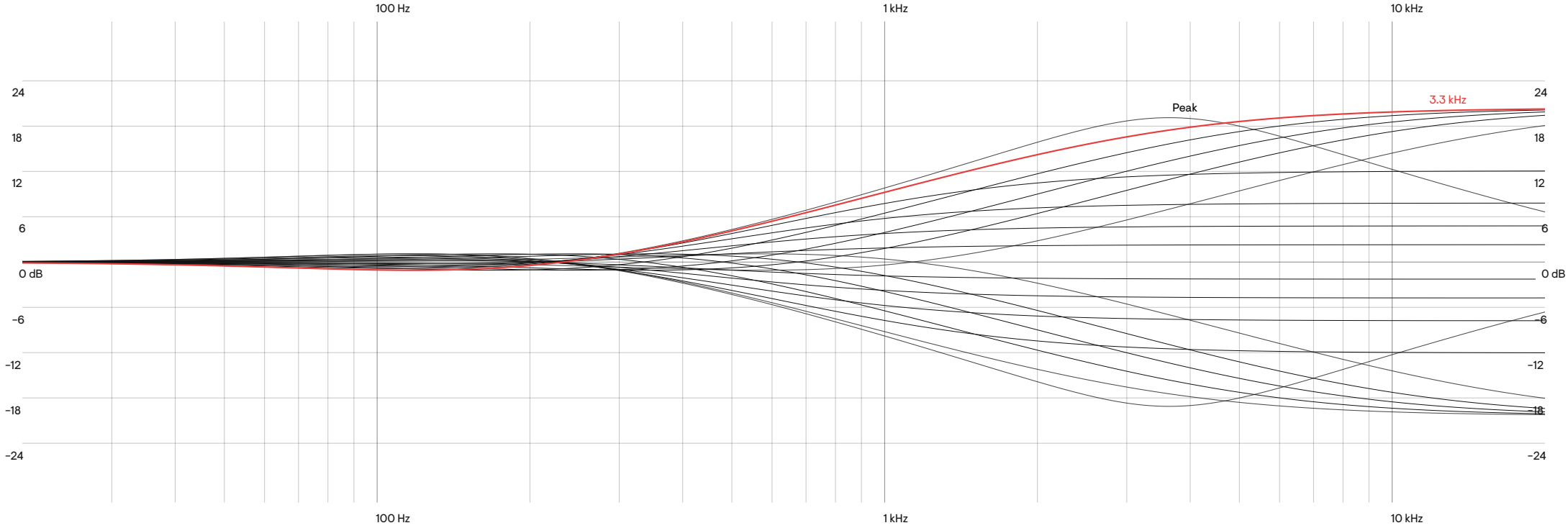


Treble

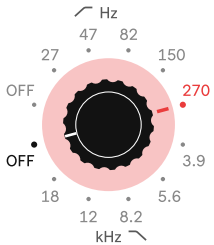


Unlike EQ 873 five corner frequencies cover much wider range and bell option allows targeter high frequency adjustment.

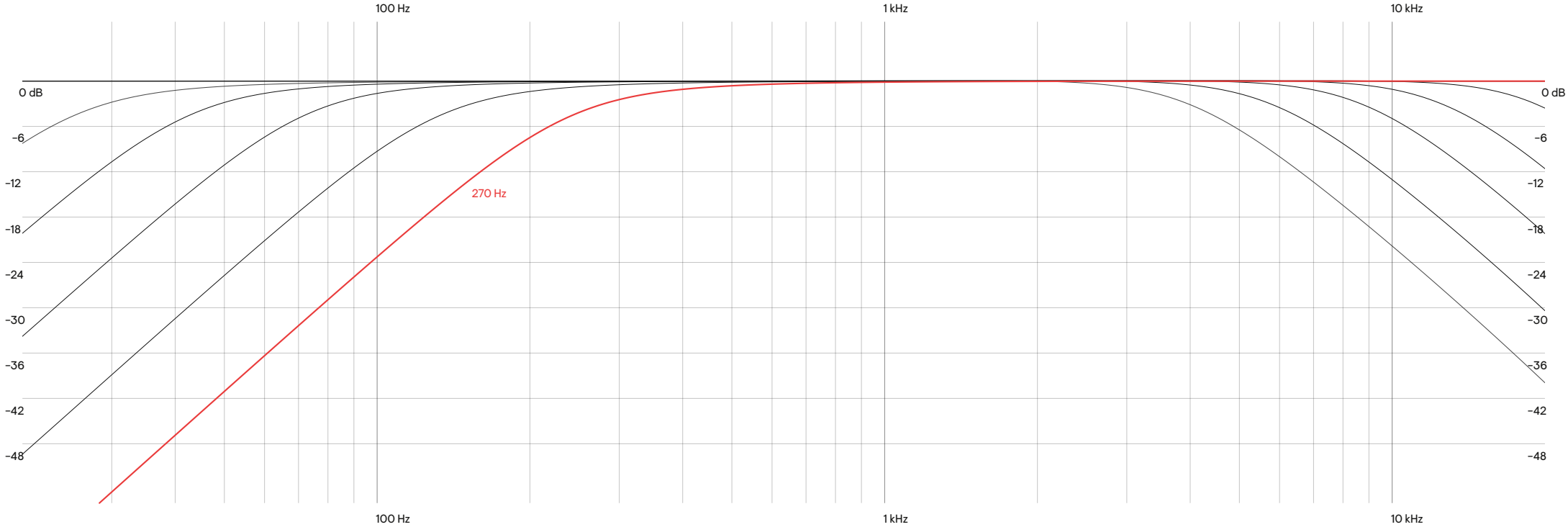
Even at its top position the shelf starts rising well below its marking, so a full boost brightens the whole top, not just the highest octave. At the lowest position it starts in the presence region, for a voice or a guitar that needs the whole top end. Turned down, it takes the glare off harsh cymbals. Press Peak at the top position and only the top octave moves, for when the presence region is already full.



Filters



Two steep filters on one control, for cleaning up what close miking lets in. The High Pass knee is firm, with no bump above it: its top step thins pads, backing vocals and acoustic guitars in a crowded mix, the middle steps take boom and proximity effect out of vocals and guitars, and the lowest clean up rumble and handling noise. The Low Pass shares the control, the knob inside the ring, and is just as steep. Its low steps make a sound small and distant or tame the fizz of a distorted guitar, the middle ones round off hiss and harsh cymbals, and the top step is barely there.



Diode Comp 854



A Board of Nails

The 2254 compressor began as a limiter for broadcast. The company's first design, built on germanium transistors, distorted badly when it worked hard, and the broadcast authority turned it down. David Rees, who had spent years at the BBC, designed a replacement, and it passed the authority's tests while it was still a development model: a wooden board with nails hammered in and the parts soldered to the nails.

Its control element is a bridge of four diodes. A single diode distorts heavily, but in a bridge most of that cancels, so the audio runs across one pair of corners while the control voltage drives the other. Rupert Neve later remembered the idea as his own; John Turner and Geoff Tanner of the drawing office credit Rees. Around it sits the line amplifier, with the bridge "strung between two transformers".

Television gave it its reputation. At London Weekend Television the audience fader swung hard into it to catch every laugh, and, as LWT sound man David Taylor put it, "the 2254's gained much of their reputation from being able to take this sort of punishment."

It changed little over the years: apart from the very first, Geoff Tanner, who ran the drawing office from 1972, called the differences "really minimal".

Comp 854 follows the /E issue, drawn in 1972 for the same Paris desk that got the first 81 circuits. Its fast limiter attack was a French request, "the French sound" in the words of the studio's chief engineer, M. Certes, though on music they preferred the slow one.

Diode Comp 854

Diode Comp 854 is the compressor and limiter of the desk's 2254, the two in series in one device. Use the compressor to even out a track or a bus, and the limiter to rein in what it lets through.



THE DIODE BRIDGE

The character of this compressor lies in its gain element: a bridge of four diodes that shunts more of the signal away the harder the control current drives them. It is not a clean-sounding element, so handle it with care.

A touch of compression stays clean, but make it work and the growl won't keep you waiting.

COMPRESSOR

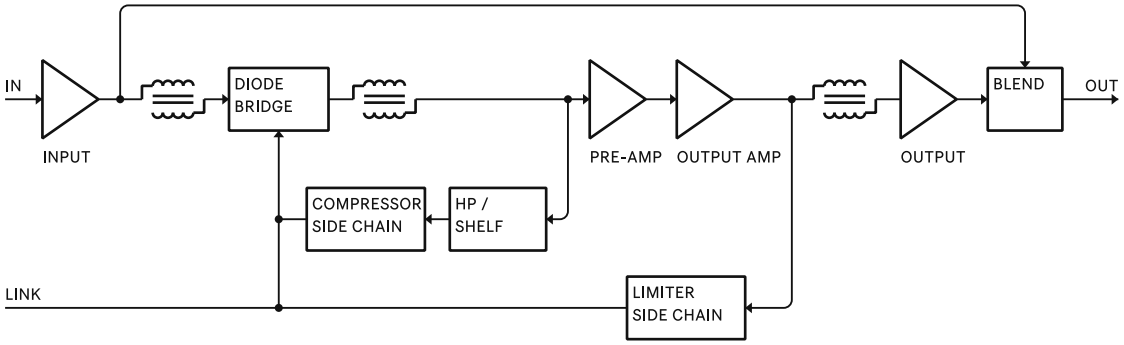
Like any good dynamics unit, it has the usual bag of tricks: it brings the loud and quiet parts closer together, adds body, sharpens transients or reins in a synth that overstays its welcome. The controls are few, yet it covers a wide range and is quick to dial in.

LIMITER

A limiter in name only: it isn't the modern kind you would use to stop peaks dead. Its attack isn't fast enough, and as a feedback design it can't work as a brickwall. With the right gain staging, though, it teams up with its sibling to rein in the big swings the compressor produces, adding a touch more bite or calming drums that get overly excited.

Signal Path

The diode bridge is the gain element, and it is why this compressor sounds the way it does. There is no VCA and no light cell: a small control current flows through four matched diodes and sets how much of the signal passes. More current, more reduction. The transition is gradual by nature, so a gain change feels like a hand easing a fader rather than a switch, and because the signal rides on the diodes' own curve, every decibel of reduction leaves a little harmonic weight behind. That is the thickening people hear in the low mids, there at a touch of compression as much as at ten decibels. With both sections out, the transformers and the amplifier still color the pass.

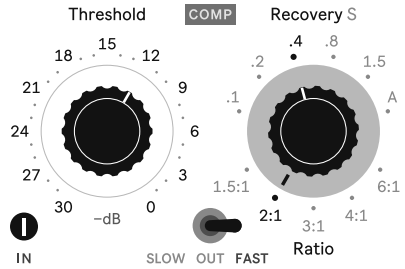


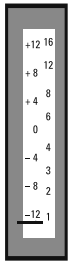
The two side chains share one control line, and the greater demand wins. The compressor listens just after the bridge, through Ratio and Threshold; the limiter at the output amplifier, where it hears whatever the compressor let through. Both measure the result of their own work, so the knee is soft and the gain settles into the music instead of grabbing. The amplifier is the 1073's class A stage with the gapped output transformer behind it, so the color is the family's: the first peaks pass, the bass rounds and, pushed, it grows an edge. Stereo is two of these units, tied by SC Link.

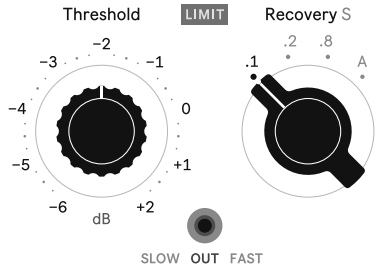
Section Overview

The panel is divided into five sections: the sidechain controls, the compressor and limiter controls with the meter between them, and the output section with Makeup and Blend for parallel processing.











SIDECHAIN

What the compressor hears, not what you hear. SC Link lets the louder side drive both channels so the image holds; HP Freq keeps a bass line from pumping the gain; High Shelf tunes the detector's sensitivity to the top.

COMPRESSOR

Input can be used to adjust the input signal level — drive the unit harder or get into the sweet spot. Threshold sets where compression starts.

Ratio and Recovery share one control: the ring sets how hard the compressor works, the knob inside it how long the gain takes to come back once the signal falls under the threshold.

The lever below switches the compressor between fast and slow attack, and the middle position takes it out of the circuit.

METER

The meter shows gain reduction. The compressor and the limiter work the same diode bridge, so it reads whichever of the two is pulling harder.

LIMITER

Threshold sets the ceiling, over a range of only 8 dB. Recovery sets how soon the ceiling lets go, 100 mS to AUTO. The lever reads SLOW, OUT and FAST: SLOW lets the first edge of a hit through, FAST catches it within a couple of milliseconds, OUT takes the limiter out.

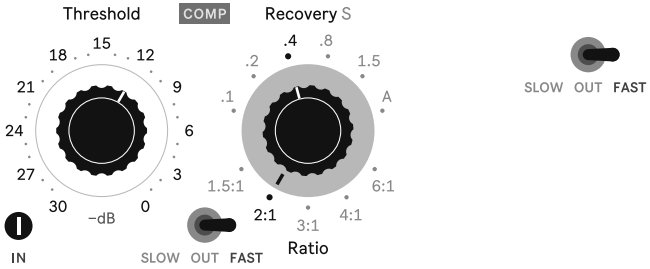
OUTPUT

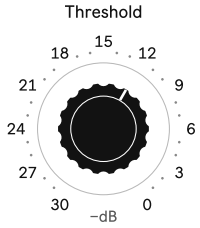
Makeup brings back what the compression took, up to 24 dB either way. Blend mixes the compressed signal with the plain input at unity.

Compressor

The compressor is the half you'll live on. Set Threshold and Ratio, pick a Recovery and leave the lever on FAST unless drums ask for SLOW.

Its best work is unhurried: a few decibels on a vocal or a mix, eight or more on a drum bus in parallel. Bring Makeup up to match the bypassed level before you judge.





THRESHOLD

Where compression begins, −30 to 0 dB. The knee is soft: at the mark almost nothing happens, a decibel of reduction arrives about 2 dB above it, the full ratio over the next ten. Set it by the meter, not the number.

COMPRESSOR MODE

The lever sets the compressor into slow or fast mode, or switches the compressor out of the circuit completely.

The original 2254 only has a single operating mode which corresponds to the fast setting. Comp 854 models this behavior in Fast mode.

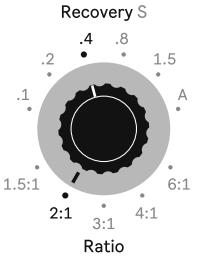
In this mode the compressor's attack is ~12 ms and is great for moderate control or highlighting the transients at gentle compression amounts. The compression quickly becomes quite dirty and apparent in this mode. With this attack modern drum work would be quite limiting, so we've worked another attack time into the circuit.

Slow mode gives you a 45–48 ms attack time added mostly for more gentle control of the tails and shaping the drums. There are other uses, like the reverb and delay, but in general that's how we'd distinguish it. Fast for more controlling action with gentle reduction amounts, Slow allows more aggressive and upfront work.

The reason 40–50 ms was chosen as an addition is because the limiter provides shorter attack times and 12 ms is often a bit too short for drum work.

RECOVERY

How soon the gain comes back, set by the knob inside the Ratio ring. The original unit has four settings: 400 mS, 800 mS, 1.5 S and AUTO. The device adds 100 mS and 200 mS, the limiter's own values, which work great on a drum bus: the kit snaps back between hits. Each is back within a decibel in about three quarters of its legend. AUTO is quick after a short peak, slow after a long passage.

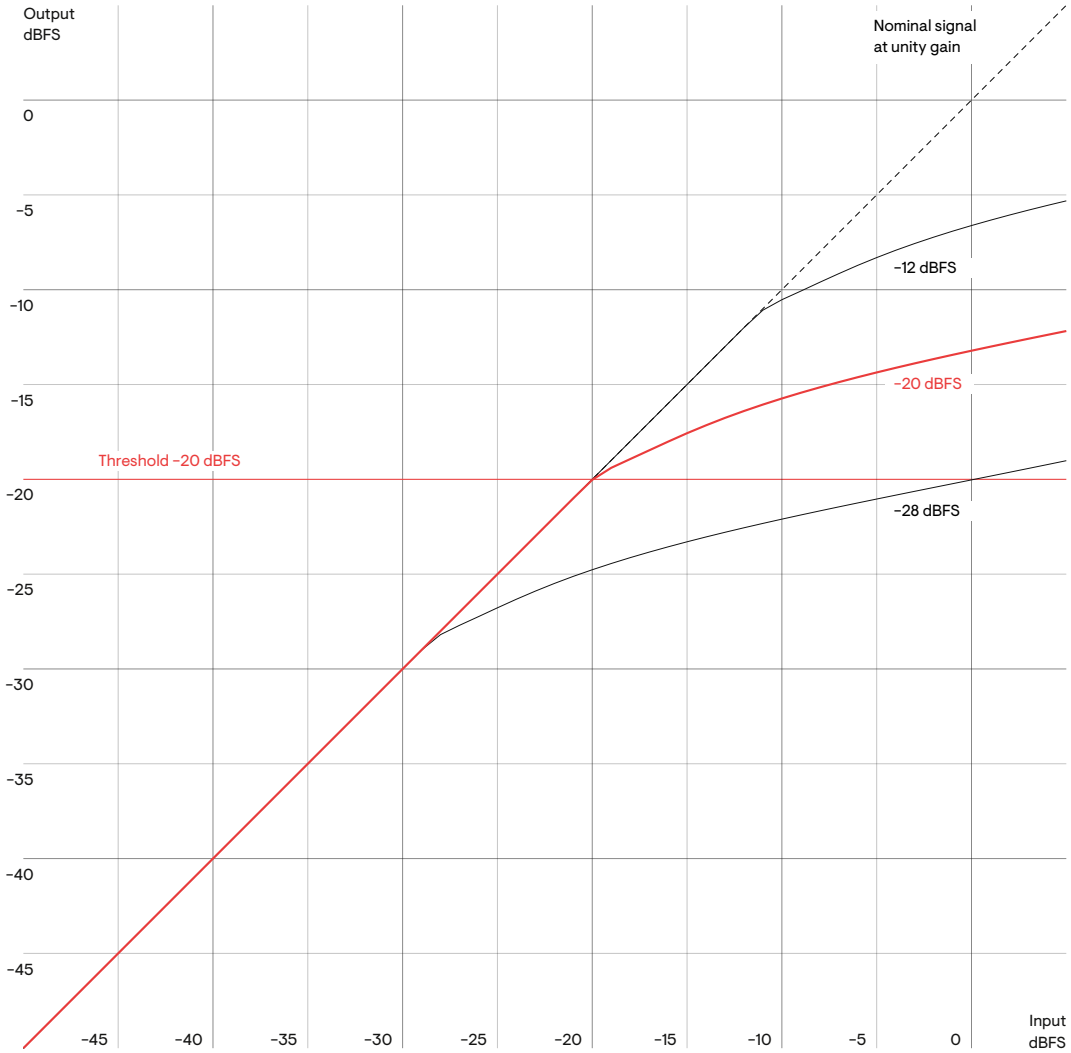


RATIO

The low ratios start later, so 1.5:1 and 2:1 take a lot of reduction and still breathe, the drum-bus trick. 3:1 and 4:1 hold a vocal or a bass in place. 6:1 is firm and tight, but be wary of the distortion it brings.

Threshold control

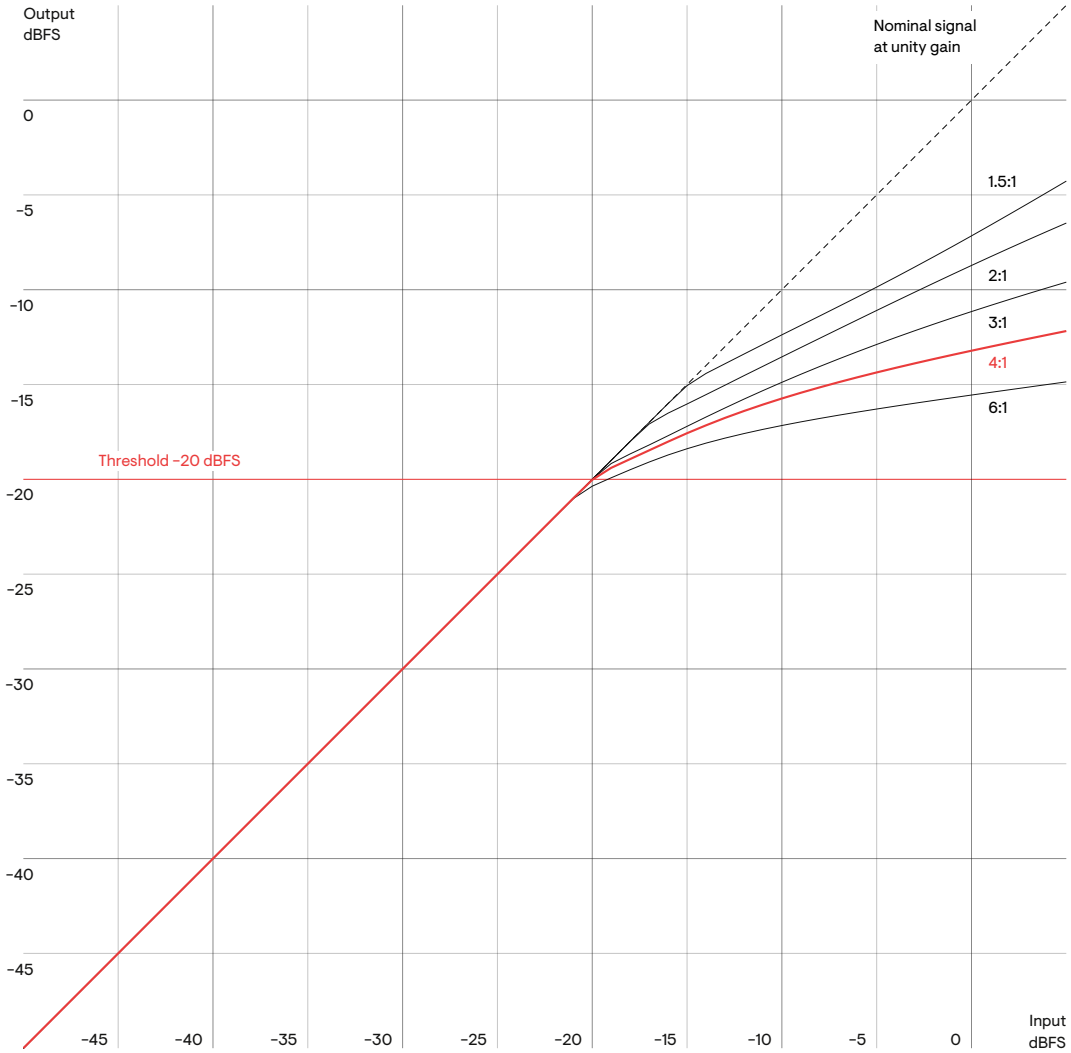
Let's look at what Threshold does to a steady tone. Ratio is at 4:1, the attack FAST and the recovery 400 mS, though neither matters here: the chart reads the output once the compressor has settled at each level.



The first thing to notice is how little happens at the mark. With Threshold at −20 dBFS the output follows the input right up to the line, and the first decibel of reduction arrives about 2 dB above it. From there the ratio builds over the next ten decibels, and only beyond that does the slope reach a true 4:1: a tone 20 dB over the threshold comes out 13 dB down. That gradual bend is the unit's manner. There is no point where compression switches on; louder notes are simply held back a little harder than the ones before them, and the ear reads it as a performance evening out rather than a device at work. It is why a few dB on a vocal passes unnoticed while the phrases stop jumping, and why a drum bus can take ten and more and still sound like drums. The other two settings, −28 and −12 dBFS, are the same shape moved along the line: lower puts more of the signal into the bend, higher leaves the quiet material alone and works on the peaks only. Find the position where the needle rests between phrases and leans on the loud ones; that is the threshold, whatever the dial says.

Ratio control

Now the Ratio switch, with Threshold held at −20 dBFS. Five positions and nothing in between, and each is a different way of leaning on the signal, not just a steeper slope.

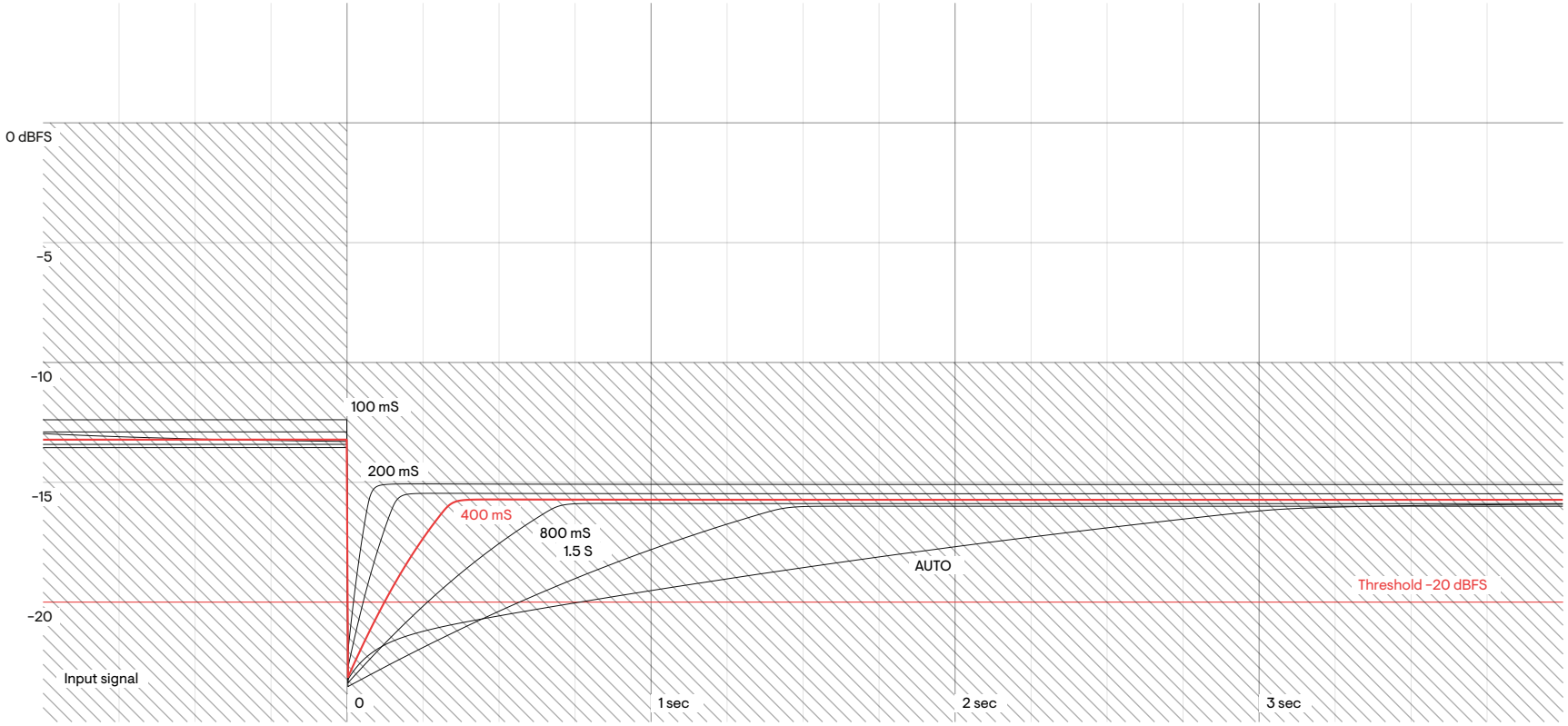


At 4:1 a tone 20 dB over the threshold comes out 13 dB down. Step through the switch and the same tone comes out 7 dB down at 1.5:1, 9 at 2:1, 11 at 3:1 and 16 at 6:1. The numbers are not the interesting part, though; the shape is. Every ratio builds over its first ten decibels, and the lower ones start later: at 1.5:1 the first decibel of reduction arrives only about 7 dB above the mark, so quiet material passes untouched and the compressor works on what is actually loud. Measured where they settle, the slopes come out at 1.9, 2.1, 2.7, 4.0 and 6.2 to one, close to the panel's figures. In use: 1.5:1 and 2:1 are for lots of reduction without the sound of it, the setting people run a drum bus through in parallel with eight or ten decibels showing and the hits still landing. 3:1 and 4:1 hold a vocal, a bass or a mix in place, and a dB or two at 2:1 or 3:1 across a whole mix is the classic. 6:1 is control, firm enough that the limiter behind it rarely has anything left to do.

Recovery timings

Recovery decides how this compressor moves, and after Threshold it is the control you'll reach for most. A steady tone at 0 dBFS is held for two seconds, deep into compression at 4:1, then drops to −10 dBFS, under the threshold.

The gain is still 13 dB down at that instant, so the quiet tone comes out too low until the compressor lets go, and Recovery alone decides how long that takes. Pushed with a short recovery and a low threshold it will pump, audibly.

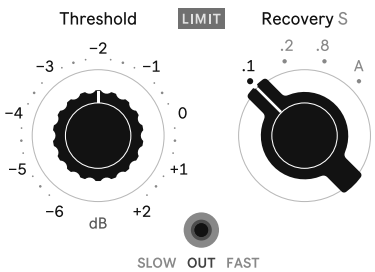


At 400 mS, the default, the level is back within a decibel in about 0.28 s: slow enough to ride a vocal or a bass without a bump, quick enough to reset between phrases.

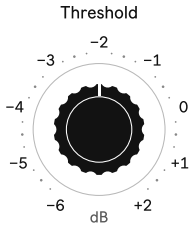
800 mS takes about 0.58 s and 1.5 S about 1.2 s. Here the compressor moves like a fader ride rather than a reaction to each note: the smoothness it is known for on a mix.

Those three and AUTO are the module's own. 100 mS and 200 mS are the device's additions, the limiter's values: back within a decibel in 66 and 136 ms, quick enough to breathe with a drum kit, gone before the next hit. AUTO lets go at once after a short peak and takes about 2.5 s after a long loud passage, so a chorus settles back without

Limiter



The limiter is the second half of the unit, and it has a job of its own: a ceiling. Where the compressor leans on the body of a sound, the limiter waits above it and steps in only when a peak reaches the level you set.



THRESHOLD

The level the limiter holds to, −6 to +2 dB. It is a real ceiling: drive 10 dB past it and the output stays at the mark within a tenth of a decibel across the range. Set it where you want the peaks to live and the limiter



RECOVERY

How soon the ceiling lets go: 100 mS, 200 mS, 800 mS or AUTO. The limiter releases more slowly than the compressor at the same legend: 100 mS is back within a decibel in about 0.19 s, 200 mS in 0.39 s, 800 mS in 1.6 s. The short settings suit the occasional peak; 800 mS holds a run of peaks at one level. AUTO is quick after a single

On the module this is where the only attack switch lives, which says what it was for: catching what the compressor's fixed attack lets through. Run it alone as a peak catcher, or after the compressor with its threshold just above the peaks.



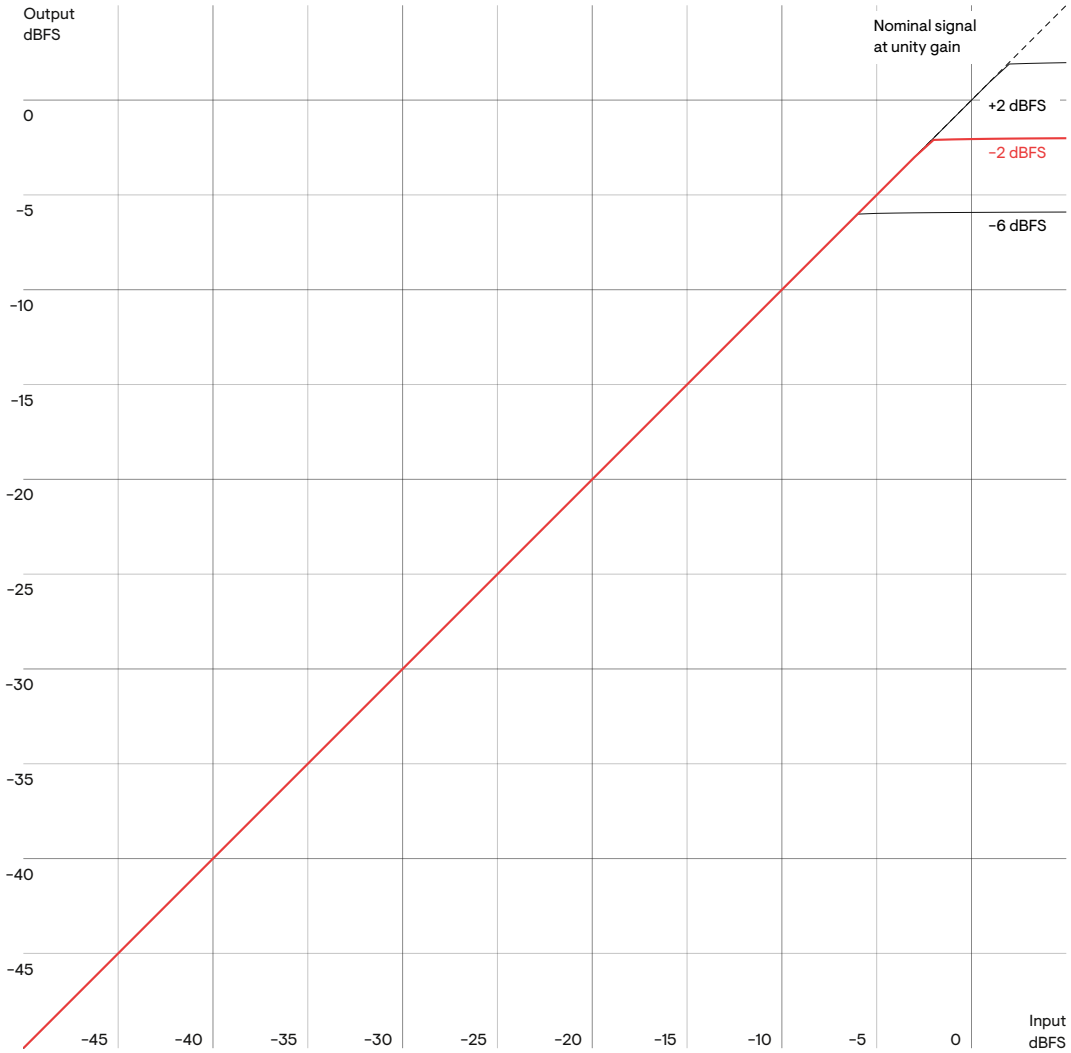
ATTACK

The lever: SLOW, OUT, FAST. SLOW, the module's standard position, lets the first edge of a hit through and settles on the ceiling in about 20 ms, keeping a kick's click and a snare's crack. FAST stops a peak dead within a couple of

Limit Threshold

Limit Threshold −2 dBFS (−6 dBFS and +2 dBFS in black), Attack SLOW, Limit Recovery 100 mS, Limit on, Compress off, Makeup 0 dB, Blend 100 %, SC Link on, HP Freq 20 Hz, High Shelf 0 dB; 1 kHz. Output is the tone's level.

Let's look at the ceiling itself. The compressor is out, Attack is on SLOW and Recovery at 100 mS, and the chart reads the output of a steady tone once the limiter has settled at each input level.



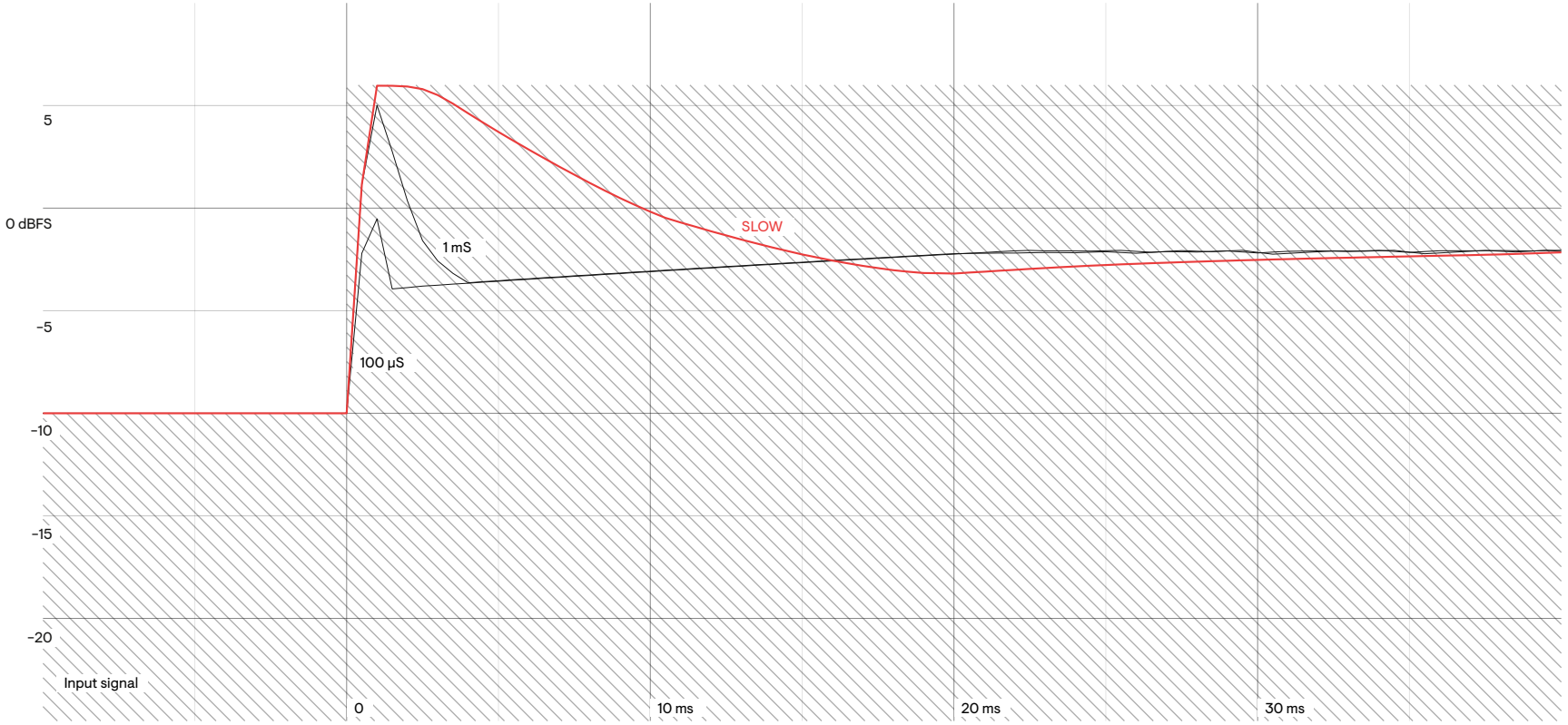
Below the ceiling the limiter does nothing at all: the output follows the input decibel for decibel, and the unit's transformers and amplifier are all that stands between in and out. At the mark the line turns and goes flat. With Limit Threshold at −2 dBFS a tone 12 dB over it, at +10 dBFS, comes out at −2.0; at −6 the ceiling reads −5.9, at +2 it reads +2.0. There is no slope above the knee to speak of and no slow bend into it: this is a limiter, not a high ratio. What that means in use is simple. Put the ceiling where you want the peaks to live, in dBFS as on Live's own meters, and forget about it. Set it just above where a mix peaks and the limiter touches only the stray hits; set it a few dB into the peaks and the whole top of the material is held at one level while the body underneath goes untouched. The level it holds to does not move with Attack or Recovery; those decide how it gets there and how it leaves, which the next two pages show. With the compressor in front, set it where the compressed peaks land and let the compressor do the leaning.

Limiter attack

Here is where the limiter earns its place. A tone at −10 dBFS, under the ceiling, jumps to +6 dBFS, 8 dB over a Limit Threshold of −2, and the chart shows the first 50 ms. The two attack positions catch it in two different ways.

On the module this lever was the only attack switch; the compressor's attack was fixed, and the limiter was there to catch what it let through. Which position to use is a choice about the front of a sound: keep it, or stop it.

Attack SLOW (1 mS and 100 µS in black), Limit Threshold −2 dBFS, Limit Recovery 100 mS, Limit on, Compress off, Makeup 0 dB, Blend 100 %, SC Link on, HP Freq 20 Hz, High Shelf 0 dB; 1 kHz. The input steps from −10 dBFS to +6 dBFS after 1 s at −10 dBFS; the output is the tone's level, read every half cycle.



Before the step the tone sits at −10 dBFS, well under the ceiling, and the limiter is idle: what you hear is the unit's transformers and class A amplifier and nothing else.

At the jump the first peaks go over the ceiling on every setting. SLOW has them back within a decibel in about 21 ms; FAST has 90 percent of the clamp in place in 1.5 ms.

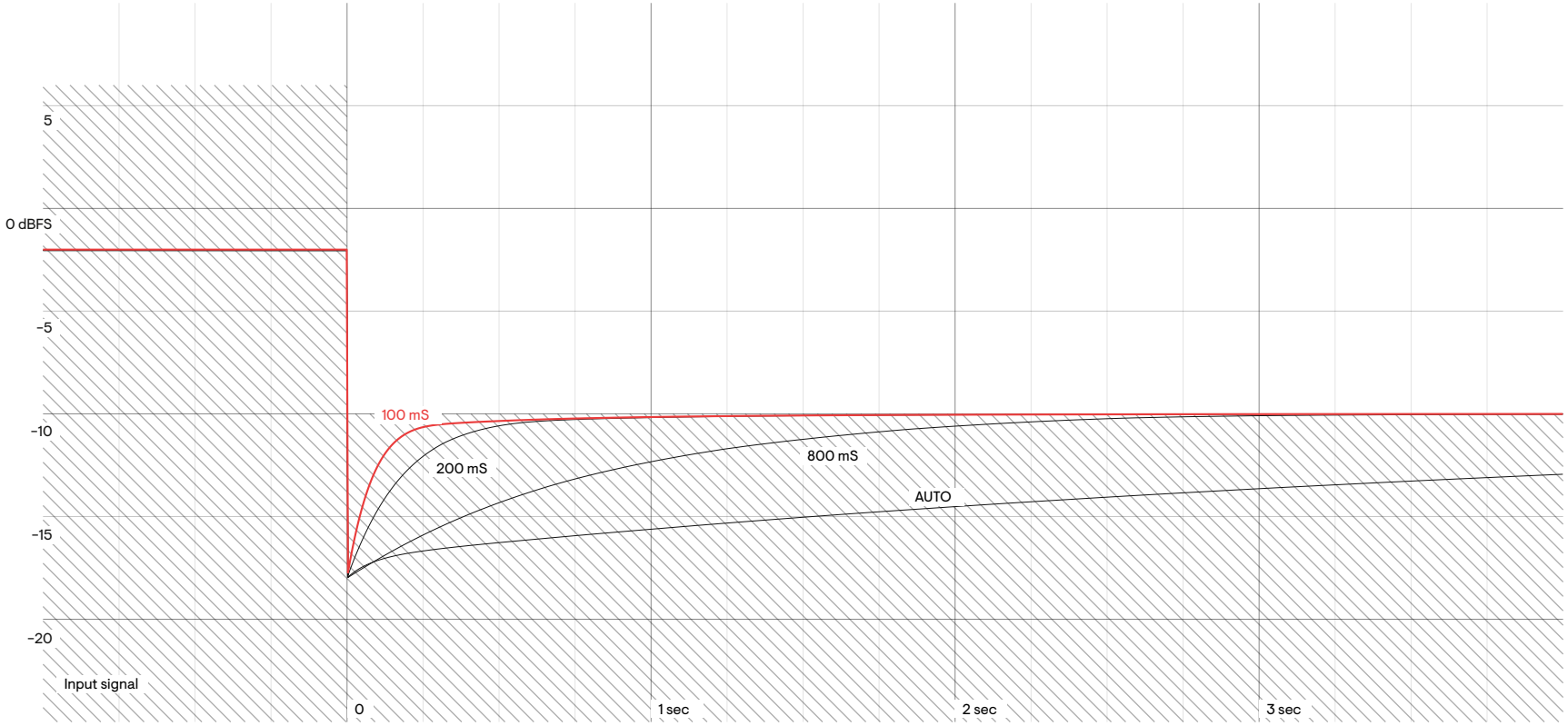
SLOW is the module's standard position: a kick keeps its click and a snare its crack, because the leading edge gets through before the gain comes down and the body is held. On bass the brief overshoot adds a little edge. FAST is the other kind of limiter: the tone sits on the ceiling within a few cycles, the position for stopping peaks dead.

Limiter recovery

Limit Recovery 100 mS (200 mS, 800 mS, AUTO in black), Limit Threshold −2 dBFS, Attack SLOW, Limit on, Compress off, Makeup 0 dB, Blend 100 %, SC Link on, HP Freq 20 Hz, High Shelf 0 dB; 1 kHz. The input drops from +6 dBFS to −10 dBFS after 2 s at +6 dBFS; the output is the tone's level, read every cycle.

Now the way down. The tone holds at +6 dBFS for two seconds, 8 dB into the limiter, then drops to −10 dBFS, under the ceiling. The limiter is still holding the gain it took when the drop comes, so the quiet tone comes out 8 dB low until the ceiling lets go.

Limit Recovery alone decides how long that takes. The limiter lets go more slowly than the compressor at the same legend, which suits its job: it is meant to hold, not to breathe. AUTO is the one to leave on if you are not sure.



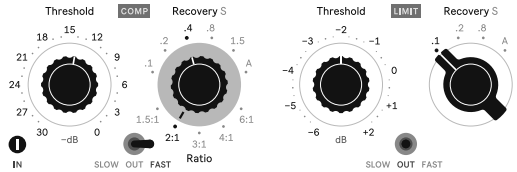
During the two loud seconds the output sits on the ceiling at −2 dBFS whatever the setting, and the limiter is holding about 8 dB of gain reduction when the drop

At the drop the tone comes out 8 dB under where it belongs; the climb back to −10 dBFS is the recovery: 100 mS is there in 0.19 s, 200 mS in 0.39 s, 800 mS in 1.6 s.

100 mS is for the occasional peak, so the music is back before the next note. 800 mS is for a run of peaks: the limiter holds through the passage and lets go once they are gone; the ceiling reads as a level. AUTO is quick after a short peak but still holds about 3 dB four seconds after a passage like this: right for a mix, wrong for drums.

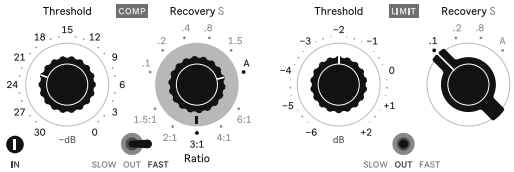
Setup Examples

Threshold settings depend on the level of your material, so treat these as starting points: the thresholds below suit material averaging around −12 dBFS. Set Threshold near 0, then bring it down until the meter moves where you want it.



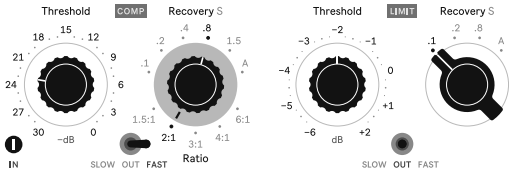
DRUM BUS

Ratio 2:1, Threshold −14, Recovery 400 mS, Attack FAST. Limiter OUT. One to three decibels on the snare hits, the needle still between them. For faster parts, try 100 mS.



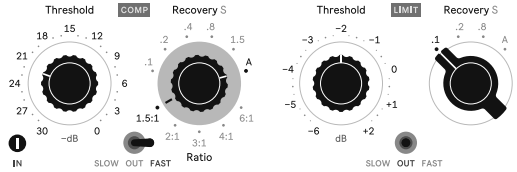
BASS

Ratio 3:1, Threshold −22, Recovery AUTO, Attack FAST. Limiter OUT. Four to six decibels on the meter: the quiet notes come up against the loud ones and the line sits even.



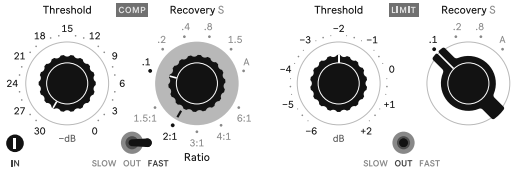
VOCAL

Ratio 2:1, Threshold −23, Recovery 800 mS, Attack FAST. Limiter OUT. Three to five decibels on the loud phrases. For a little more bite at the start of the words, try 400 mS.



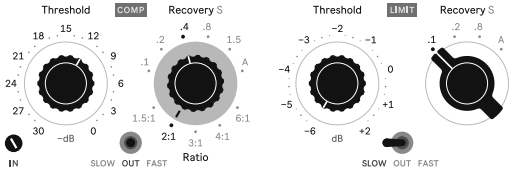
MIX BUS

Ratio 1.5:1, Threshold −22, Recovery AUTO, Attack FAST. Limiter OUT. One to three decibels on the loudest passages and no more. For a firmer, more audible grip, try 100 mS.



PARALLEL DRUMS

Ratio 2:1, Threshold −30, Recovery 100 mS, Attack FAST. Limiter OUT. Threshold all the way down, about ten decibels on the hits. Then bring Blend down until the compressed kit sits under the dry one.



ROOM MICS

Compressor OUT. Input +12, Limiter SLOW, Threshold −6, Recovery 100 mS. Drive the room into the limiter: the hits are held ten decibels or more down, and the gain is back within a fifth of a second.

Bus 872


A
S
B
S
Solo
Output
Makeup
0.0 dB
Blend
100 %
Bus 872
LIMIT
Drop Audio
Effects Here
Test
Pre
EQ
873
Diode Comp 8 Bus

The Destination

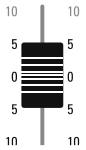
The 1272 line amplifier is the summing point for all tracks. It was first drawn on 3 December 1968, and it became the amplifier behind the groups of desk after desk. In those desks the channels met on a passive, unbalanced bus, each one feeding it through its own resistor, and the mix arrived far below line level: “often around −40dBu”, as Geoff Tanner, head of the factory’s drawing office, later put it. The bus always went into an input transformer, and the 1272’s one job was to lift what came out of it back to 0 dBu, on every group, all day.

Inside, it carries the same class A amplifier board as the 1073 and the same gapped output transformer. Its level control sits between the amplifier’s two halves, and in a desk that place belonged to the group fader. The small 10-into-2 desk of 1969 used five of them, on both groups, echo, foldback and talkback; the 24-into-8 desks put one on each of their eight groups. When the factory’s compressor came along, it went back to the same audio path.

In the early 1990s, as racked console modules found their way into home studios, the 1272 was modified to work as a microphone preamp, and that is the form most people know it in. Bus 872 puts it back where it was drawn to sit, with the whole mix passing through it. It is modeled on the July 1970 issue of the module, on a group bus of thirteen feeds, with the group fader as its one control.

Bus 872

Put Bus 872 on a group or the master — it treats the summed signal as the desk's bus and runs it through the amplifier every desk group passed through. At working level it is nearly transparent, and that is the point. 0 on the meter is full scale, and full scale is +8 dBu, the hot working level of the period: the PPM's peaks to tape, not the 0 VU line-up. A choice from experience: most of us aim a mix at 0 dBFS, some drive instruments hot and mix lower, so full scale sits where the desk ran its hottest.



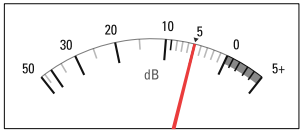
FADER

The group fader, +10 dB at the top to −60 at the ∞ mark, unity at the 0 mark; 1 dB on the fader is 1 dB of level. The module's clip is about 20 dB above full scale, so a mix peaking at 0 dBFS stays clean even at +10; Live sums in 32-bit float, so the edge is reached only on purpose, a hot group with the fader up. Pulled down, the input half, ahead of the fader, still takes the whole bus and gives way above +23 dBFS in.



LIMIT

A true-peak limiter, the one modern stage, On by default. Below full scale it does nothing, bit for bit; above, it looks ahead and lets go in about 30 ms, so nothing leaves above −0.3 dBTP. Off, the output passes untouched, with the same delay.



METER

A peak programme meter on the DIN scale. A 10 ms burst reads within about a decibel, 20 dB fall in a second and a half. 0 is full scale; with Limit On the needle never crosses it, and the red zone is only reached with Limit Off. The needle follows the louder channel, and a marker holds the highest true peak, red from 0.

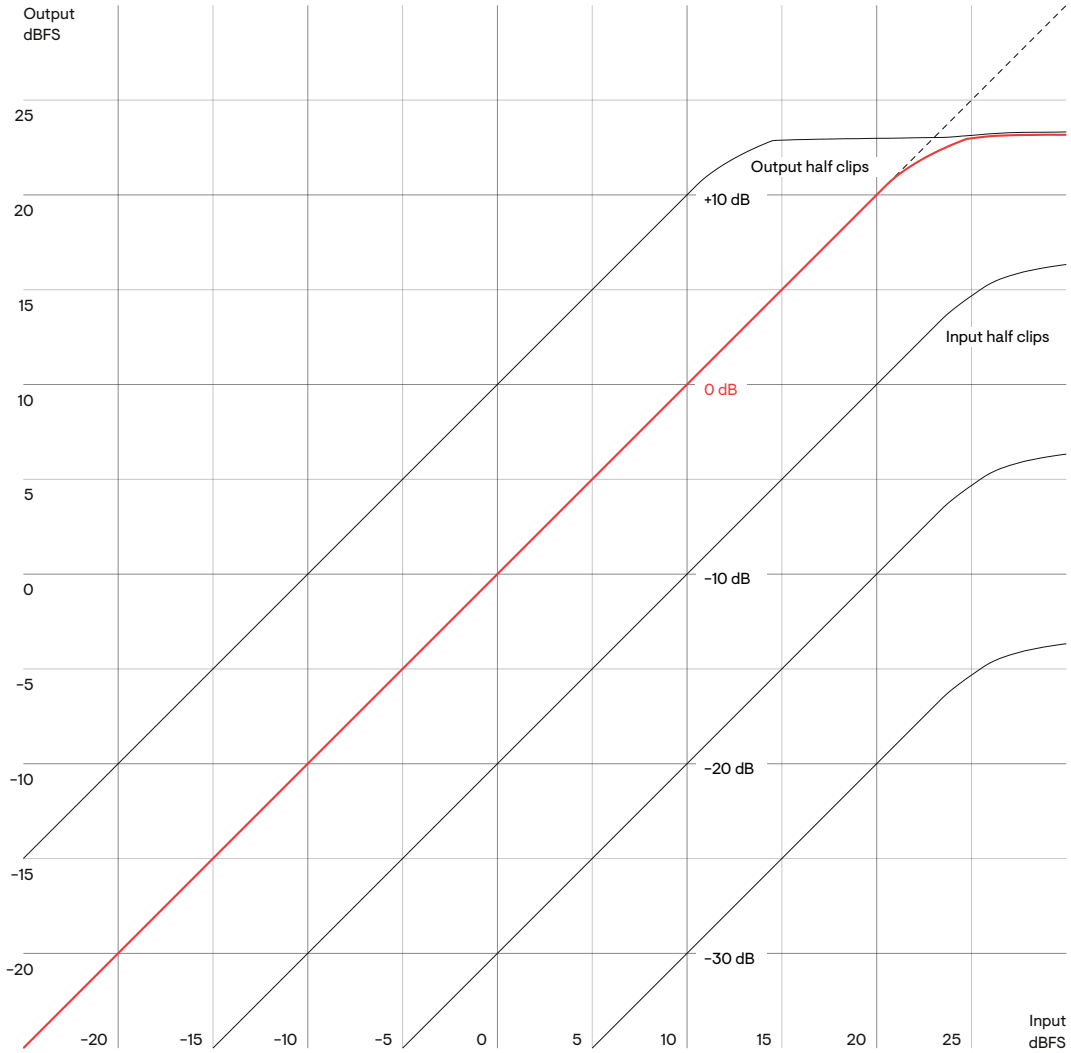
A NOTE FROM THE MAKER

If you are strapped for CPU or running on Push 3, skip this

Group Fader

Fader at the labelled position, 0 dB (the 0 mark) in red; 1 kHz, Limit Off. Output is the tone's level.

A 1 kHz tone runs through the bus at five fader positions, the 0 mark in red. Up to +20 dBFS in the red line is a ruler: 1 dB on the fader is 1 dB of level, and a mix peaking at full scale leaves 20 dB under anything the amplifier can do.

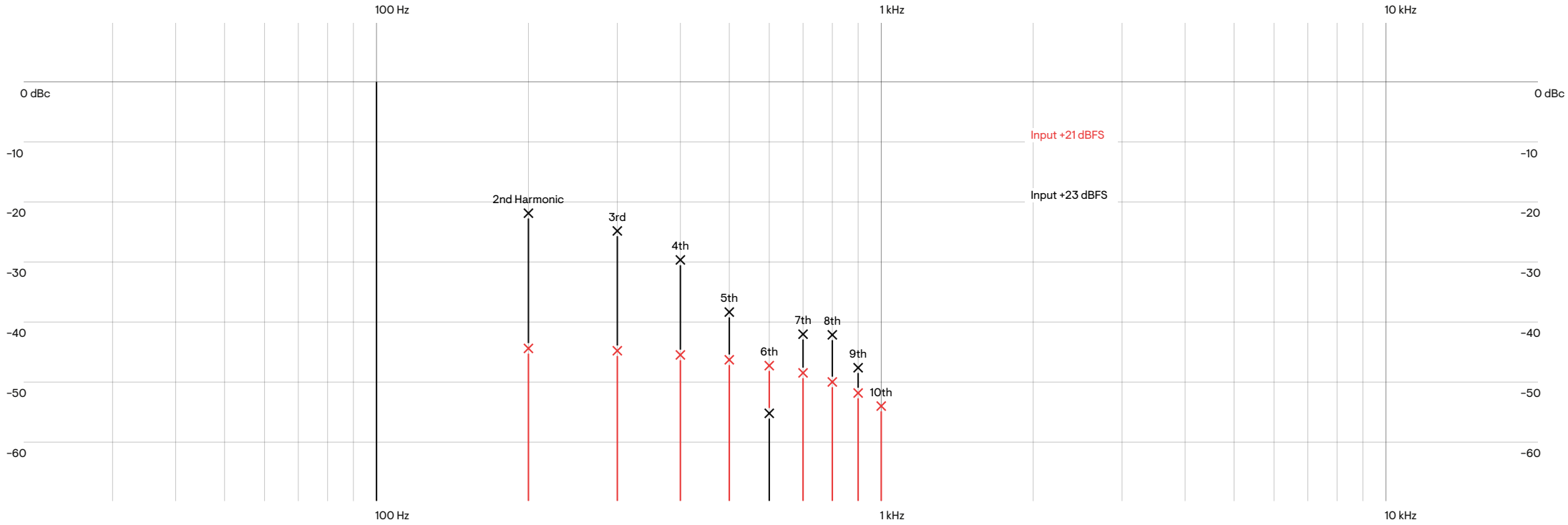


Then the output half and its transformer give way quickly, 1.3 % at +21 dBFS in, 6 % at +22, the output topping out at +23. Push the fader up and the ceiling arrives 10 dB sooner; pull it down and the lines run straight until the input half, which the fader cannot relieve, gives way from +24 dBFS in. Ride the fader for balance, as on the desk. The edge is a decision: a group driven well over full scale with the fader up.

Harmonics

100 Hz at +21 dBFS in (+23 dBFS in black), Fader at the 0 mark, Limit Off. Each cross marks a harmonic's level under the tone: −20 dBc is a tenth of it, −40 dBc a hundredth.

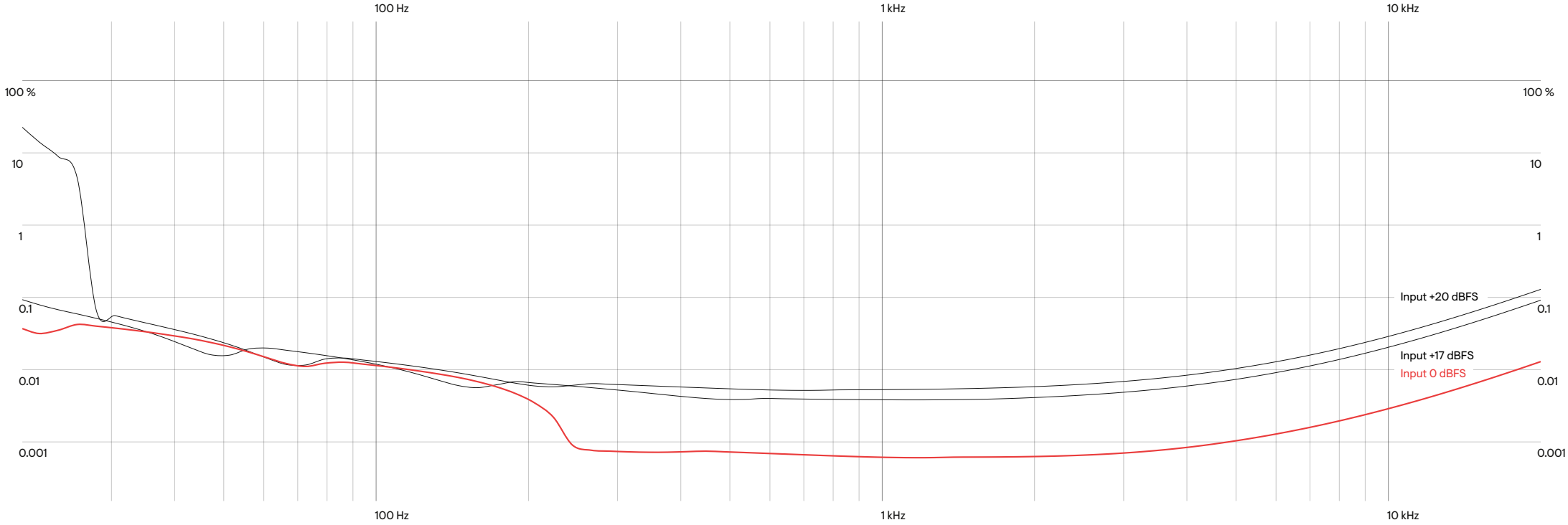
At any level a mix would normally run, this amplifier adds nothing you can hear, and that is the honest part. A 100 Hz tone at full scale leaves every harmonic under −79 dBc, and 20 dB hotter it reads the same: clean to a decibel under the clip, then everything arrives at once. The red stems are +21 dBFS in: 1.3 % in all, even and odd harmonics side by side in a flat comb from −44 dBc at the second to −54 at the tenth, both halves of the wave squared off alike, dense and hard rather than rounded. The black stems, +23 dBFS, are well into it: 11 %, the second leading at −22 dBc with the third at −25, the same second-harmonic lean as Pre 873. An effect for a drum group driven hard, not a shading for the mix.



Distortion

Sine at 0 dBFS in (+17 dBFS, +20 dBFS in black), Fader at the 0 mark, Limit Off. Higher means more distortion: at 1 % the added harmonics sit 40 dB under the tone, at 0.01 % 80 dB under.

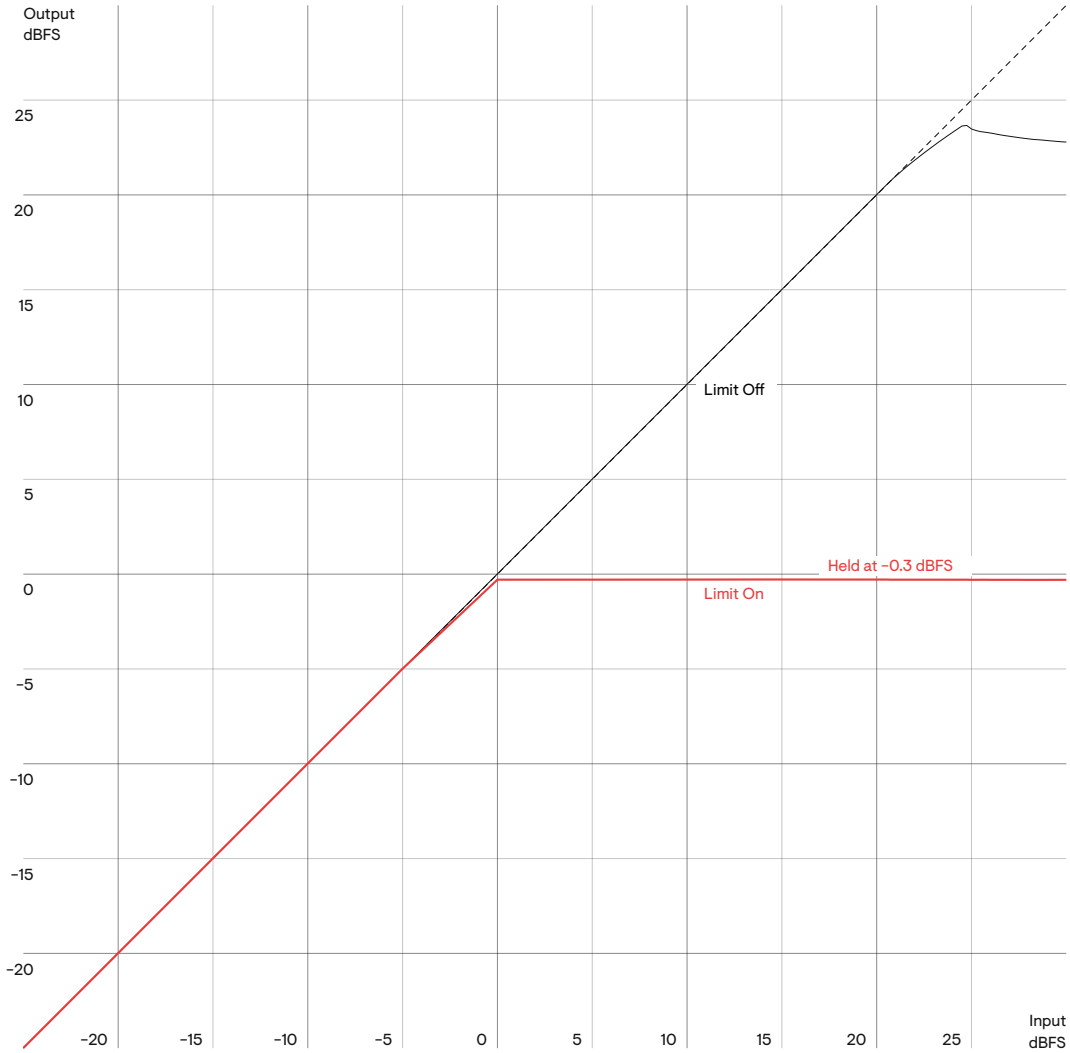
What the bus amp leaves on a mix at level lives in the bottom octave, and it is small. A sine sweeps the band at three input levels, fader at the 0 mark. Red is full scale: 0.0006 % at 1 kHz, nothing through the mids and top, a slow rise toward the bass to 0.04 % at 20 Hz, the transformers' iron under a kick or a sub. At +17 dBFS the mids barely move, 0.004 % at 1 kHz, while 20 Hz climbs to 0.09 % and below it the curve shoots up. At +20 the deep bass has gone, 23 % at 20 Hz with 1 kHz still at 0.005 %: the output transformer runs out of room in the sub 3–4 dB before the amplifier clips anywhere else. A full-scale mix with the fader at +10 reads 0.04 % at 20 Hz, nothing to hear. Push a sub-heavy group well past full scale and the bottom blooms first.



Limiter

The one modern stage, and it earns its place by doing nothing most of the time. A 1 kHz tone runs in at the 0 mark; the chart reads true peak, what a converter actually sees.

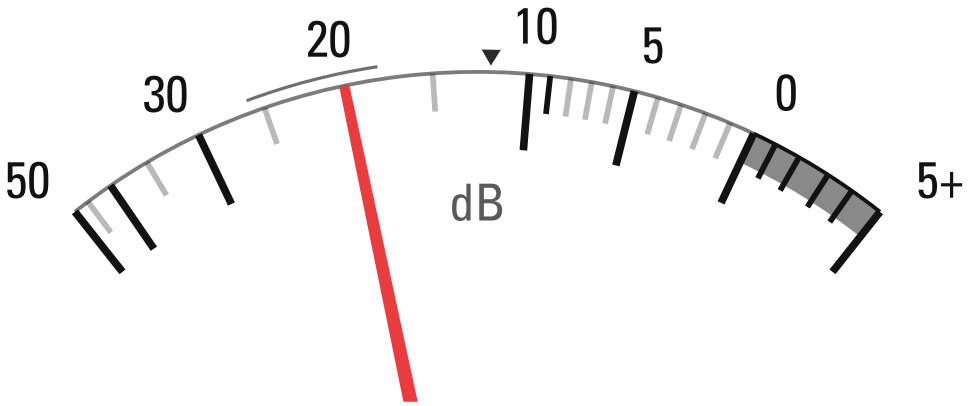
Limit On (Off in black), Fader at the 0 mark; 1 kHz. Output is the true peak: Limit holds it at −0.3 dBFS from full scale up; Off, the module itself gives way about 20 dB above it.

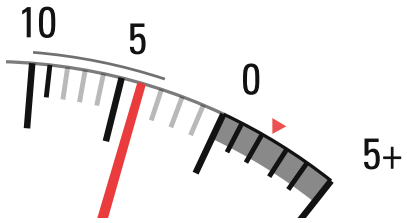


Red is Limit On: on the black Off line to −1 dBFS in, parting from it at full scale and holding −0.3 dBTP from there to +30 dBFS in. Below full scale, On and Off are identical to the bit. Black is Limit Off: 1:1 to +20 dBFS in, then the module itself gives way, a highest peak of +23.7 dBTP, easing back as the clipped wave squares off. Leave Limit On on the master for a safe bounce. Switch it Off on a group that feeds another limiter, or when you want the module bare, over full scale and all.

Metering

Bus 872 reads its output on a peak programme meter to the German broadcast standard, DIN 45406, the meter IEC later filed as Type I. Desks of the period were drawn with either kind: the block diagram of the small 1073 desk labels its meters “V.U. or PPM”. Like the circuits, the meter is modeled from the published standard and then tested against it, burst by burst.





THE SCALE

From −50 to +5 dB on a semi-logarithmic law: the bottom is squeezed and the top spread out, so 0 dB sits at about 83 % of the arc and the working range gets the room. The law is measured from the faces of period Siemens and NTP meters. On a broadcast desk 0 was the permitted maximum, and line-up tone sat on the red tick at −9. Here 0 is full scale: a 0 dBFS sine, +8 dBu at the module’s output. With Limit On, the needle stays out of the red.

BALLISTICS

The needle answers to peaks, but not instantly. The standard sets its rise with tone bursts: a 10 ms burst must read 1 dB under its steady level, 5 ms 2 dB under, 3 ms 4 dB under. Bus 872 reads 1.1 dB under at 10 ms and 3.6 dB under at 3 ms. The fall is 20 dB in a second and a half at a constant rate, the same number of decibels every second, so a decay reads as an even glide. The needle is a moving-coil movement with its own mass and damping; it overshoots by a few tenths of a decibel, inside the 1 dB the standard allows. Both channels drive it, and the louder one wins.

THE TRIANGLE

The triangle marks the true peak: the output at four times the sample rate, so it also catches the overs that fall between samples, the ones a converter will see. It jumps at once, holds for a second and a half, then eases down, and turns red at 0. The needle usually stops short of it, and that is deliberate: a snare hit lasts a few milliseconds, and the standard tells the needle to read it several decibels low. The gap is the reading: a wide one means sharp transients over the body of the mix; needle and triangle close together mean dense, flattened material.

Under The Hood

Six devices modeled on four modules: the 1073 and 1081 channels, each split into a Pre and an EQ, the 2254 compressor/limiter and the 1272 bus amp

Each original circuit traced from its factory drawings into a complete circuit model, part by part. Every device is built from that model and checked against it

A serial number for each channel of every device, each one its own set of component tolerances. Consecutive numbers make a matched pair

Pre 873's single-ended class A output clips lopsided, led by the second harmonic. Pre 881's push-pull class AB clips evenly, led by the third

Frequencies on switches, as on the originals: EQ 873's Low, Mid and Low Cut beside a fixed 12 kHz High shelf; EQ 881's four bands with Peak and Hi Q, plus High and Low Pass

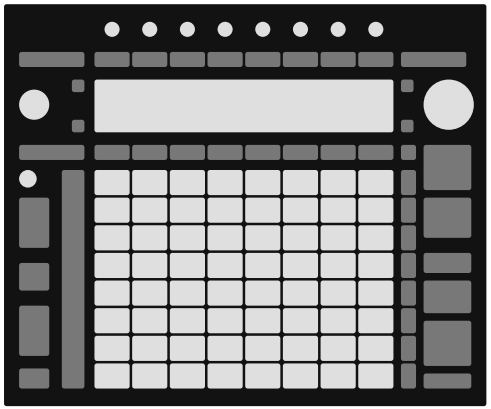
Diode Comp 854 is modeled on the 2254/E: compressor and limiter share one bridge of four diodes as the gain element, with five ratios and AUTO recovery on both

Bus 872 brings the 1272 line amp to a group or the master: the group fader, a DIN peak program meter, and a true-peak limiter as the last stage

Added to the 2254 circuit: Input, sidechain HP Freq and High Shelf, a slower attack, faster recoveries, Makeup to ±24 dB, Blend, and switchable hum and hiss

Output trims on every Pre and EQ, a Bias trim on Pre 881, and both EQs draw your curve over the output's spectrum

Transformer iron modeled in every device: pushed hard, the cores thicken the lowest octaves



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Device Data

Specifications

	PRE 873	EQ 873	PRE 881	EQ 881
Latency 44.1 kHz 48 kHz 96 kHz	48 samples 1.09 ms 1.00 ms 0.50 ms	53 samples 1.20 ms 1.10 ms 0.55 ms	48 samples 1.09 ms 1.00 ms 0.50 ms	53 samples 1.20 ms 1.10 ms 0.55 ms
Oversampling	2×, output stage	4× shelves and presence, 2× Low Cut and output stage	2×, output stage	4× filters, Treble and Upper, 2× Lower, Bass and output stage
Sample rates	44.1–192 kHz	44.1–192 kHz	44.1–192 kHz	44.1–192 kHz
0 dBFS	+28.8 dBu at the output (1 kHz, 0.1 % THD)	unity at 1 kHz	+30.1 dBu at the output (1 kHz, 0.1 % THD)	unity at 1 kHz
Controls	Drive 0 to +36 dB, Output ±12 dB	Output ±24 dB	Drive 0 to +36 dB, Output ±12 dB, Bias 0–100 %	Output ±12 dB
Parameters	7 automatable	12 automatable	8 automatable	20 automatable

Specifications

	DIODE COMP 854	BUS 872
Latency 44.1 kHz 48 kHz 96 kHz	0 samples 0 ms 0 ms 0 ms	92 samples 2.09 ms 1.92 ms 0.96 ms
Oversampling	none	2× output stage; the limiter reads true peak at 4×
Sample rates	44.1–192 kHz	44.1–192 kHz
0 dBFS	+10 dBm at the input	+8 dBu
Controls	Input ±12 dB, Makeup ±24 dB, Blend 0–100 %	Fader +10 to −60 dB and off; Limit holds −0.3 dBTP
Parameters	18 automatable	4 automatable

A personal note

Thank you so much for checking out my work. I hope it helps you explore and learn these tools. I would never claim great expertise in audio engineering, but through my love for this craft I hope to shed a bit of light on it. I'm always happy to share what I know, and I'd especially love to hear your thoughts on the result. Please don't hesitate to reach out with questions, concerns, feedback or anything else.

You can reach me at info@monomono.audio, or send me a message on Instagram at @monomono.audio. I handle all my communication myself and will be happy to hear from you.

Oh, and while the research and proofreading were done with the help of various language models, every single em dash in this manual was put in by hand. Decades of print-design experience still leak through in my copy.

— Nikita
Including this one. It's ⌥+⇧+-. You're welcome.

Disclaimer

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The people quoted or credited in this manual are quoted from the published sources below. Their words describe the original hardware, not Console 80, and no endorsement by any of them is claimed or implied.

Rupert Neve, on the 24-volt rail, the transformer and the diode bridge: postfade.co.uk, Early Rupert Neve Consoles and Their Stories, Parts 2 and 5, from his 2013 interviews; on crossover distortion: AudioTechnology, interview by Greg Simmons, Part 2, 1998.

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David Rees, credited with designing the 2254 by Geoff Tanner (Gearslutz, August 2008) and by John Turner (postfade.co.uk, Part 5). David Taylor, author of postfade.co.uk, on the 2254 at LWT: Part 10. M. Certes, chief engineer at Sofrason, Paris, on the 2254/E: Studio Sound, November 1974, quoted in postfade.co.uk, Part 10. Ian Bruce, on the group bus: GroupDIY, January 2022. Allen Farmelo, on racked modules: Tape Op #77, 2010.

The history also draws on the work of Derek Stoddart, Tony Cornwell, Colin Morton and Ray Prickett as recorded by postfade.co.uk and AMS Neve. Further data comes from AMS Neve's company history and factory documentation, technicalaudio.com, Studio Sound via worldradiohistory.com, and the Internet Archive. None of their authors reviewed or endorsed Console 80.

Release Notes

1.0 — OCTOBER 11, 2026

Initial Release

1.01 — OCTOBER 27, 2026

Fixed an issue with 44.1 KHz sample rate on Pre 873, Pre 881 and Bus 872.