

R52 BAXANDALL

NEGATIVE FEEDBACK TONE CONTROL

User Guide

Version 1.0

PULSAR MODULAR

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PREFACE

I wasn't trying to build another tone control.

I wanted to hear the sound Peter Baxandall described in his published work: not a later interpretation, not a modernized version, and not simply the familiar shape of a Baxandall curve. The goal was to understand what the circuit actually delivered when built and operated under the conditions he specified. That became the foundation of R52 Baxandall.

We studied the published circuit, its component values, its feedback arrangement, and the surrounding signal-chain conditions that shape its behavior, then modeled those elements as one connected system rather than an isolated filter.

The guiding question was what Peter heard in his laboratory, and it drove every decision that followed: the amplification sits inside the EQ rather than after it, the valves in both circuits are modeled rather than approximated, and LOAD exists because he could not have heard this circuit without an amplifier and a loudspeaker on the end of it. What comes out is the wide and wild tone shaping of the network, together with the way its amplifier and feedback respond as the signal passes through.

In 1952 those conditions were fixed by whatever hardware you owned. R52 puts them under your fingers, which widens what the circuit can do without altering the circuit itself.

R52 is a revival, not a revision. Peter Baxandall published the design in *Wireless World* in October 1952, and what began on those pages became one of the most influential circuits in audio. Yet, the industry adopted only its shape, redrawing the circuit to fit commercial realities rather than the conditions Peter specified.

Three quarters of a century later, we returned to the source, rebuilding the circuit and the conditions that defined it. This is that circuit.

Ziad Sidawi
Pulsar Modular

PART I • STARTING

CHAPTER ONE

WHAT R52 IS

R52 is a faithful reconstruction of Peter Baxandall's original 1952 two-knob negative feedback tone control, preserved exactly as he designed it.

BASS and TREBLE are the original 1952 controls, and on most material they are all you need. They are two arms of one network rather than independent bands, so they interact. Raising one changes what the other is working against. Lifting both produces a third shape. They are deliberately broad, made for shaping the character and balance of a sound rather than chasing individual frequencies.

Because the valve is part of the EQ circuit, level is part of the sound. INPUT is therefore more than a simple gain control. It determines how hard the valve is being driven. At ordinary levels, the circuit remains low-distortion and relatively clean. As you push the input harder, the valve contributes progressively more color. There is no separate clean mode because there is no separate saturation stage to switch off. Quiet is clean. Loud is colored. INPUT determines where you sit between the two.

The original circuit also depended on the conditions around it. SHELF chooses between the two treble behaviors Baxandall published for the 1952 circuit, from a lift that keeps climbing to one that bends into a shelf. In the 1957 network only the counterclockwise end is his, and there the dial acts as a top-end control in its own right. SOURCE selects what feeds the EQ; LOAD represents the amplifier and loudspeaker at the far end. These were facts of a 1952 installation, and R52 puts them under your fingers without changing the underlying circuit.

R52 also extends the original into a modern instrument. Baxandall's design was mono. R52 can run on any channel count, from a single channel through immersive beds, with one modeled valve circuit per channel.

1.1 VERSION Changes the Circuit

VERSION replaces the circuit itself. 1952: the original circuit, on the SP61 pentode. 1957: his later network, on the ECC81 double triode, as he published it. 1957 ALT: the same 1957 network, on the 1952 SP61 pentode - a Pulsar Modular pairing he never built.

1.2 What R52 Is Not

Not a surgical EQ - there are no frequency, Q, or band controls; R52 shapes overall character and balance, so for removing a specific resonance use a parametric EQ. Not an EQ with a saturator after it - the distortion comes from the amplifier the EQ is built around. Not a clone of a commercial unit - R52 was built from Baxandall's published work, not modeled on an existing Baxandall-derived product. Not a restoration of a specific piece of hardware - the circuit was published as a design, not sold as a product, so there is no box to restore. R52 is the circuit itself, as Baxandall published it. He wrote it for people who would build it; we built it and brought it to the desk.

1.3 What We Claim

The EQ curves are calculated from the circuit itself rather than approximated with standard filters, and the SCOPE draws from that same calculation. The distortion tracks level in proportion, with no threshold in between. We do not claim that R52 sounds like a particular piece of equipment - we checked it against Baxandall's published curves and measurements instead.

CHAPTER TWO

FIVE-MINUTE WALK

1. Put R52 on something broad - a full mix, drum bus, bass, acoustic guitar, vocal, or anywhere you would reach for a tone control rather than a scalpel.
2. Turn MATCH on so your first judgments are about tone, not level; turn it off when ready to commit the level change.
3. Start with BASS and TREBLE, making decisive moves and listening to the whole sound.
4. Lift BASS then TREBLE and listen to the middle - the two are arms of one network, so lifting both pushes the middle back; open SCOPE to see the curve.
5. If a large TREBLE lift gets glassy, add SHELF rather than backing off the lift.
6. Set INPUT for character. Use OUTPUT for final level, or hold SHIFT while adjusting INPUT to counter-move OUTPUT and compare drive changes at the same loudness. When AMP is active, INPUT also determines how hard the amplifier is driven.

TIP: The same applies to any comparison - including R52 against its own bypass or another EQ. Match the levels first, or you are judging loudness.

PART II • UNDERSTANDING THE CONTROLS

CHAPTER THREE

BASS AND TREBLE

These are the two controls the 1952 unit had, and on most material they're the whole session. Everything else in R52 exists to change what these two are working with.

3.1 One Network, Not Two Bands

Bass and treble aren't independent filters sitting side by side; they are part of the same feedback network, so each one changes what the other is working against. Lift both and you don't get the sum of two curves: you get a third shape, with the region between them pushed back further than either control moved it alone. Cut both, and the middle comes forward the same way. This is the behavior people describe when they say a Baxandall "opens up" a mix, and it's the main reason this EQ feels different from a shelf pair.

Open the SCOPE and it becomes obvious: the bold trace is the composite, and the faint traces behind it are each section on its own. The gap between them is the interaction.

3.2 Use Big Moves

Both controls run from -1 through 0 to +1, built for large gestures: a decisive move on BASS is a small angle, not a nudge. They reach further at the edges of the band than in the middle and much further than most modern EQs go; the far end of either control is a place you visit deliberately. Fine corrective work belongs to another tool. Set what you want, listen, and come back if it's too much.

3.3 What Each One Does

BASS is a shelf that keeps growing toward the bottom. In the **1952** circuit it never really stops, running below hearing into pure weight, which is why it can feel bottomless on modern material. In the **1957** circuits it turns over and falls away beneath instead, trading that weight for a defined hump on the fundamentals with the mud pulled out underneath. That's why the same move reads as "big" in 1952 and "punchy" in 1957.

TREBLE has the reach. It climbs well past where a modern EQ would stop, and **SHELF** decides how far it keeps climbing.

3.4 Knob Position and Actual dB

Three places tell you where you are: the readout under the knob (the position itself, for writing a setting down), the help strip (the real dB the knob is adding, computed for the circuit that is running, so it stays honest when you change VERSION), and the SCOPE (the whole curve, where the shape and interaction are visible). Moving BASS, the strip reports the shelf at two depths; moving TREBLE, it reports the lift and where the curve has started to move.

NOTE: At an identical knob position, 1952's treble delivers roughly three times the lift of either 1957 circuit. The circuits are genuinely different, which is much of why VERSION exists. Don't carry knob positions between voicings and expect the same sound - read the dB, not the angle.

3.5 The Number Under the Knob

Baxandall's treble and bass controls were potentiometers (continuous). In R52, dial the knob or click the readout underneath and type a value in.

The knobs run from -1 to +1, while the readout counts in thousandths to deliver exact recall. When you type, the size of the number decides how it is read: anything above 1 is thousandths, and anything within ± 1 is the faceplate scale. Type 500 or type 0.5 and you land in the same place, with the readout showing +500 either way. The one to watch is a bare 1, which is full travel rather than one thousandth.

3.6 The Red Dot: How Far Down Your Move Reaches

TREBLE on this circuit does not work at a fixed frequency. A small lift stays up in the air. A large one reaches down into the presence range and takes the upper mids with it. The red dot on the SCOPE shows where that reach currently ends.

Use it when a treble move is doing more than you asked for. If you went looking for air and the dot has slid down near 2 kHz, you are lifting presence rather than air, and that is usually what a vocal or a snare is reacting to. Back the knob off until the dot climbs back to where you meant to work.

On small moves there may be no dot at all, and the 1957 circuits need a good deal more dial before one appears. That is the same message read the other way: nothing has reached far enough down to matter yet.

CHAPTER FOUR

SHELF

SHELF decides how the top of the instrument finishes.

In the 1952 circuit that's one question: when you lift TREBLE, does the lift keep climbing to the top of the band, or corner into a shelf? In the 1957 circuit the dial is also a top-end control in its own right. One rule covers everything it does: clockwise is more shelving, and more shelving is a tamer top.

NOTE: This dial runs the opposite way to a treble control, because it isn't one. Turning it clockwise gives you less top end, not more - you're adding shelf, not adding treble. That trips up everyone at least once: if a SHELF sweep seems to be going backwards, it isn't. It's doing what it says - more shelf, less reach.

It's the one control that exists because Baxandall left the question open. Rather than choosing an answer, he published both and suggested a switch.

4.1 Published Positions and R52 Extensions

In the 1952 article he published two families of treble curves from the same circuit. The full lines, which he preferred, keep rising toward the top of the band; the dotted ones bend into a shelf instead.

He was direct about it: he didn't consider the second family as good a shape for ordinary use, but because the question was, in his words, "a very controversial matter," he suggested putting both on a switch so the builder could choose. On R52 that switch is a dial, so in 1952 mode you can also stand anywhere between his two published positions.

In 1952, both ends are his: the counterclockwise end, with the tap earthed, is the published condition he preferred, and the clockwise end is his own alternative shelving, from the correction he published a month later. The continuous ground between them is R52's.

In 1957, only the counterclockwise end is his. He drew that network with the tap earthed and published no alternative for it. The rest of the dial is R52's extension of the choice he offered in 1952, kept deliberately to widen what the instrument can do, not left in by accident, but uncharted rather than rejected. He simply drew it earthed and moved on.

A fresh insert starts with SHELF at zero: the published condition in either circuit, and in 1952 the family he preferred.

4.2 What It Does to a Mix

Turn SHELF clockwise and the top end bends over instead of running away; counterclockwise, the brightness keeps reaching.

TIP: On bright modern material, a large TREBLE lift with SHELF at zero can get glassy. Rather than backing off TREBLE, bring SHELF up instead. You will often keep the brightness you wanted and lose the edge you didn't. That's the single most useful thing to know about this control.

SHELF moves the low end too. Add shelf and the top comes down while the low end gains a little weight, so the balance of the whole track tips, not just the top octave. The move is small in 1952 and clear in the 1957 circuits, where SHELF works more like a whole-instrument balance control than a treble trim. Judge it on the full mix, not by soloing the top end. If the bottom has gained more than you wanted, take it back on BASS.

4.3 How SHELF Differs Between the Circuits

What differs is whether it waits for you. In 1952, SHELF is waiting. With TREBLE flat it's inert: no lift to bend, so it does nothing until you give it something to work on.

In the 1957 circuits it acts regardless of TREBLE. That network has its own top-end character for the dial to work on, so with TREBLE flat the whole top still moves by several dB across the travel. It reads as a top-end level control first and a shape control second. If you switch to a 1957 position and the top end isn't where you expected, check SHELF first.

4.4 Reading the Ends of the Dial

The ends of the dial carry small drawings of the response shape you're turning toward, and they change with VERSION.

	Counterclockwise end	Clockwise end
1952	the lift keeps climbing	the lift corners into a shelf
1957	the top end standing at full height	the top shelved down

These are exactly what the SCOPE shows at each end.

CHAPTER FIVE

INPUT, OUTPUT, AND THE GLOW

INPUT decides how much valve is in the sound, OUTPUT only decides how loud it leaves, so the two are not interchangeable.

5.1 INPUT Is a Tone Control

INPUT sets how hard the signal hits the circuit's amplifier. Drive it gently and it stays essentially clean; drive it harder and it adds density, weight, and a rounding of edges that grows with level. INPUT isn't there to fix your gain staging - it is there to decide how much of the valve you want in the sound.

5.2 OUTPUT

OUTPUT sits after everything: the shaping, the drive, all of it. It changes how loud the result leaves the plugin and nothing else.

Use it to balance R52 against bypass: set the character with INPUT, bring the level back to where bypass sits with OUTPUT, then flip IN/OUT and judge tone with loudness out of the argument. MATCH automates this comparison; this is the manual version, useful against any reference, not just bypass.

5.3 Setting INPUT by Ear

Set INPUT last, after the tone move, and judge it at the level the track runs at. Hold SHIFT so loudness stays out of it, then push until the weight arrives and edges begin to round. There is no threshold to hunt for: a whisper wants a whisper's worth of valve, a drum bus much more, and a hot INPUT is a color you chose, not an error. Lowering INPUT while SHIFT compensation holds the output level gives AMP more headroom. The change is audible in the way transients and low-frequency material open up under the same listening level.

TIP: Hold SHIFT and drag INPUT, and OUTPUT counter-moves by the same amount, so drive changes without a loudness change. This lets you audition drive honestly - sweep INPUT with SHIFT held and you are hearing the valve alone, at a pinned level. Without the link, every drive change is also a volume change, and volume biases what you hear.

5.4 The Tone Controls Feed the Drive Too

A big treble lift colors the sound as well as brightening it: the boost works the valve as INPUT does. If a lift comes back thicker than you wanted, keep the curve and SHIFT-drag INPUT down: the valve backs off, the shape stays. Cuts come back cleaner as well as quieter. The lamps show the sum.

5.5 The Valve Lamps

Two valves flank the R52 BAXANDALL label, one per channel, each a live meter for that channel.

They are a headroom meter, not a distortion meter: brightness shows how close that channel's valve is running to its own ceiling. Push INPUT up and it brightens; lift treble hard and it brightens even with INPUT untouched, since the boost drives the valve just as the knob does. On a peaky source it flares on transients and settles between them, so brief hits register rather than flickering past.

Because each lamp watches one channel, a lopsided source shows up as lopsided glow - a bass panned left works the left valve harder, and the lamps show it before a level meter would.

Within one voicing, brighter means more drive and more character. Set a level by ear, and the lamp lets you recognize the same working state on the next song.

5.6 Reading the Lamps Across Voicings

Each valve is metered against its own ceiling, and the two bottles differ in both available swing and character. For example, 1957 ALT reads brighter than 1957 at identical settings while distorting substantially less - the pentode runs nearer its own ceiling, while the triode makes more harmonic content at a lower fraction of its own. Between voicings, the dimmer lamp is often the more driven sound. The lamp answers one question: how hard is this valve working, in the circuit you've chosen.

A lamp at full brightness isn't a clip warning - there's no clip to warn about. It means that valve is deep into its available swing, which on the right material is exactly the sound you want. R52 imposes no ceiling of its own.

5.7 AMP Overload and Headroom

When AMP is active, the AMP lamp flashes red when the amplifier is overdriven. A second indicator beside the INPUT title flashes with it. These indicators appear only while AMP is active and identify amplifier drive, not input level.

Lower INPUT for more headroom, or retain the drive when it serves the material. Hold SHIFT while lowering INPUT so OUTPUT counter-moves and the output level remains stable. This makes the change in headroom easier to hear: transients have more room, and bass or low-mid material can feel less constrained without becoming quieter.

Use the red indication as a guide, then decide by ear. INPUT remains the control that sets the amplifier drive.

CHAPTER SIX

SOURCE

SOURCE sets the driving impedance feeding the tone circuit. In 1952, source impedance was not an adjustable parameter - it was a fixed constraint of your equipment chain that dictated how the tone controls responded.

6.1 How Source Impedance Shapes the Controls

SOURCE fundamentally alters filter behavior. As source impedance rises, boost and cut curves sag, bass and treble bands exhibit heavier interaction, and available treble lift diminishes. Even when knob positions stay identical, the underlying circuit transfer function changes completely.

Peter Baxandall specified that the driving impedance should remain "reasonably low, preferably not more than about 10 k Ω " for his published component values. That recommended boundary is marked directly on the control.

6.2 Reading the SOURCE Dial

The shaded arc from fully counterclockwise up to the 10 k Ω mark is the 1952 region - the condition Baxandall designed for, and where the instrument is at its best.

Mark	What it was
600 Ω	Vintage studio line standard and the nominal low-impedance benchmark.
10 kΩ	Baxandall's stated upper design limit; the threshold for predictable curve behavior.
39 kΩ	Typical vacuum-tube anode output, representing a common vintage hardware mismatch.
250 kΩ	High-impedance passive volume-pot wiper feed, typical of domestic hi-fi stages.

The plugin initializes at 0 Ω to match the zero-impedance nature of modern digital audio workstations. The 600 Ω mark serves as a guide to the period's standard line-level feed.

6.3 Tonal Behavior Across the Dial

0 Ω to 600 Ω (Nominal Baseline): The circuit operates unloaded and open. The difference between 0 Ω and 600 Ω is subtle but measurable: 600 Ω introduces roughly 0.04 dB of broadband loss and about 0.13 dB of attenuation on fast transients.

1 k Ω to 10 k Ω (Punch and Definition): Low-mid energy around 300–600 Hz gently dips while sub-bass thump remains intact. Because boxiness attenuates without altering the low end, the material sounds punchier and clearer without applying active EQ boost.

10 k Ω to 39 k Ω (Transient Softening): High frequencies roll off progressively. On percussive material with bright attacks (snare transients, kick beaters, picked acoustic strings), the transient hit softens while low-end weight stays firm. On bright, sustained material (cymbals, shakers), the overall signal level drops uniformly.

Up to 250 k Ω (Hardware Starvation): Overall output drops significantly, the transient response blurs, and the frequency spectrum tilts heavily. This reproduces the heavily loaded response of vintage high-impedance domestic gear.

6.4 Workflow and Practical Application

SOURCE is a tone and response-shaping control, not a simple attenuator. Increasing SOURCE changes filter curves, interaction, and available treble lift - adjusting gain afterward matches listening volume, but preserves the altered frequency shape.

- **Set SOURCE first:** Choose your driving impedance before making EQ decisions, treating it as the foundational circuit condition.
- **Clear low-mid clutter:** If a drum bus or bass track feels congested, sweep between 1 k Ω and 5 k Ω to hollow out boxiness naturally.
- **Compensate gain transparently:** Hold **Shift** while dragging **INPUT** to link and invert **OUTPUT** by the same amount, maintaining constant loudness as impedance increases.
- **Audition the zero baseline:** Hold **Cmd+Opt** (macOS) / **Ctrl+Alt** (Windows) over the SOURCE knob to temporarily audition the 0 Ω response without changing the knob position or writing automation.

LOAD AND AMP

LOAD models the receiving end of the vintage signal chain: the power amplifier driving a loudspeaker. While SOURCE sets the impedance driving the circuit, LOAD sets the output impedance of the amplifier at the far end: how tightly it grips a fixed 15 Ω loudspeaker. In 1952, tone controls fed tube power amplifiers whose output impedance dictated how tightly the amplifier controlled (damped) the speaker cone. R52 puts that acoustic interaction on a single stepped control.

7.1 Damping and Output Impedance

The values on the dial indicate the **amplifier's output impedance**, not the loudspeaker's nominal rating. R52 models a fixed 15 Ω vintage studio monitor; the LOAD dial controls the amplifier's damping factor (grip) over that driver:

- **Lower impedance (Tighter grip):** High damping factor. The amplifier stops the cone immediately when the signal ends, yielding tight bass and flat transient control.
- **Higher impedance (Looser grip):** Low damping factor. The speaker continues moving slightly after the signal stops, introducing low-end bloom, scooping low mids, and softening high frequencies.

7.2 The Five Load Profiles

Left-click **LOAD** to step forward through the settings; right-click to step backward. The plugin's SCOPE display updates in real time to reflect the active LOAD curve.

Setting	Modeled Condition	Sonic Character & Application
OFF	Complete stage bypass (Infinite damping)	Transparent and linear. Represents a modern solid-state amplifier with total cone control.

0.7 Ω	High-feedback vintage tube amplifier	Subtly dips 200 Hz and softens top-end glare. Ideal for tucking harsh elements slightly back in a mix.
1.5 Ω	Typical 1970s tube power amp	Cleans up boxy low mids, firms fundamental bass, and smooths upper frequencies.
2.5 Ω	Moderate-damping tube amplifier	Noticeably hollows out 200 Hz and rolls off above 10 kHz. Well-suited for dense, overly bright material.
3.5 Ω	Low-damping character stage	Pronounced low-mid dip with audible top-end softening; acts as a tonal shaping tool rather than subtle polish.
7.0 Ω	Historical loose-damping profile	Maximum low-end bloom, deep low-mid hollow, and soft top. Picks up a proposal from the LS3/5A's own research report, a seven-ohm feed to extend its bass, that was published but never adopted (Chapter 22).

7.3 Workflow and Evaluation

OFF as absolute baseline: **OFF** removes the amplifier/load stage entirely rather than simulating a fractionally tighter amp. Every fresh instance initializes at **OFF** to guarantee neutral operation until intentionally engaged.

Audition bypass: Hold **Cmd+Opt** (macOS) / **Ctrl+Alt** (Windows) over the LOAD control to momentarily revert to **OFF** and evaluate the stage's total contribution without losing your setting.

Level matching: Because higher impedance values attenuate low mids and highs, perceived loudness shifts across steps. Engage **MATCH** (Chapter 10) to audition tone changes at equalized loudness.

7.4 AMP

AMP adds an amplifier stage to the LOAD path. LOAD remains the normal fast colour; AMP is for tracks where you want more depth and weight from the same signal-chain idea.

Use AMP selectively on material that benefits from it, such as bass, drums, or a source carrying the low-mid body of a mix. The AMP button is on the top rail between SCOPE and the menu.

7.5 AMP Requirements

AMP operates when LOAD is active. With LOAD set to OFF, the AMP button is unavailable.

AMP runs on stereo and mono instances. In MID, SIDE, L, or R modes, LOAD remains available but AMP is unavailable.

AMP saves with presets and sessions, travels with A/B slots, and marks a preset as changed when its state is edited. Switching AMP, changing LOAD settings, or turning LOAD off is click-free during playback.

7.6 AMP Lamp States

AMP lamp state	Meaning
Amber	AMP is active in live monitoring.
Purple	The session is running above 96 kHz. AMP will print in freeze, render, and export, while live monitoring uses the LOAD path.
Red flash	AMP is being overdriven. Reduce INPUT for more headroom, or retain the drive deliberately.

7.7 LOAD with AMP Enabled

With AMP active, LOAD controls the amplifier character rather than selecting LOAD's fixed profiles. Lower settings keep a tighter, more controlled low end. Higher settings add weight, soften the top end, and reach overload sooner at the same INPUT setting.

The settings are level-matched for comparison, so move through LOAD by listening for character rather than loudness. Use INPUT to decide how hard AMP is driven, and use SHIFT while adjusting INPUT when you want to compare changes at a stable output level.

7.8 AMP at High Sample Rates

AMP runs live at session rates up to 96 kHz. Above 96 kHz, the purple AMP lamp indicates that AMP will print in freeze, render, and export while live monitoring uses the LOAD path.

Freeze the track to hear the printed AMP result in context. Unfreeze to adjust the setting, then freeze again. At rates above 96 kHz, use freeze or export rather than an in-session resample when you need the AMP result committed to audio.

7.9 CPU Use

AMP uses more CPU than the standard R52 path, so reserve it for the instances where its contribution matters most.

TIP: When an AMP setting is final, freeze the track or create an offline bounce and re-import it. This commits the sound and releases CPU for the rest of the session. Keep the original track disabled or archived if you may want to revise the setting later.

CHAPTER EIGHT

VERSION

VERSION replaces the circuit itself.

There are two circuits, and the difference between them is larger than anything the tone controls can do. The later network offers a choice of valve, giving three positions:

Position	Circuit	Valve	Character
1952	The original 1952 network, as published	SP61 pentode	A broad treble shelf that keeps climbing toward the top of the band, and a bass shelf that keeps growing toward the bottom without stopping. The circuit the rest of this guide describes, and the one to reach for when you want the instrument's full reach.
1957	His later network, as published	ECC81 double triode	Redrawn values and an added component with no counterpart in the original. The treble becomes a presence control - roughly a third of 1952's lift at the same knob position - and the bass turns over into a defined hump on the fundamentals with the mud pulled out below.
1957 ALT	The 1957 network, with the 1952 SP61 pentode swapped in	SP61 pentode (from 1952)	The 1957 curves with a tighter low end: same punch and presence, but the front of a bass note keeps its articulation where 1957 thickens it. A Pulsar Modular pairing Baxandall never built.

8.1 Choosing Between the 1957 Valves

The two 1957 positions are one network with a choice of valve, and the choice is an amount, not a kind. At every setting, 1957 carries roughly three times the color of 1957 ALT, with the same harmonic character. There is no “smoother valve” to reach for - only more or less of the same thing.

The difference shows up most at the low end: at bass-register frequencies the SP61 (in 1957 ALT) runs about three times cleaner, so note attacks keep their articulation where the ECC81 (in 1957) thickens them. Reach for 1957 ALT when the 1957 shape is right and the bottom is going soft; reach for 1957 to hear the network as he published it, color included.

There is no meaningful dynamics difference between them, and neither valve becomes more colored at any particular SHELF position - SHELF only changes how much top end is left to hear the difference through.

8.2 R52 Extensions and the Published Circuit

The circuits themselves are Baxandall's, untouched. Two things around them are R52's extensions: the SHELF range in 1957 (only the counterclockwise end is his published condition), and the 1957 ALT pairing. Everything else - values, topology, the two networks themselves - is as published.

8.3 Second Voicing, Not a Revision

The 1957 position is his own second voicing, not a revision of the 1952 article. Baxandall never wrote a second tone-control paper; this network arrived inside a preamplifier design. Chapter 20 has the story.

IN/OUT

IN/OUT is the lamp button in the middle of the faceplate - R52's own bypass. It exists to give a fair answer to "is this instance making the mix better?"

9.1 Bypass Operation

Bypassed, R52 passes your audio through untouched - not flat settings, not a polite version of the circuit, but output equal to input, bit for bit. Active and bypassed carry exactly the same delay, so toggling never shifts the audio in time, and the switch is click-free - no pop, no dropout - so you can flip it mid-phrase rather than in a pause. With IN/OUT the only variable is whether the circuit is there. Use this button rather than your host's: host bypass implementations vary, some keep latency compensation and others drop it and renegotiate, introducing a timing jump right when you are trying to listen, while R52's IN/OUT keeps the plugin in the path and timing identical in every host.

NOTE: Bypass against a flat, active R52 isn't a comparison of two identical signals - passing through the circuit costs a fraction of a decibel even at rest, which is real circuit behavior, not a fault. A fraction of a decibel is enough to sway a close comparison, so judge with MATCH engaged, decide, then turn MATCH off.

PART III • WORKING WITH R52

CHAPTER TEN

MATCH

Louder wins. Play the same material at two levels and the louder pass sounds better - fuller, clearer, more exciting - even though nothing about the tone actually improved. An instrument that moves as much energy as R52 makes this easier to fall for than most.

MATCH removes level from the question. While engaged, R52 holds its sustained output loudness at the level of the dry input regardless of what you do to the controls, so turning a knob changes tone, not level.

10.1 What MATCH Holds

MATCH holds sustained loudness - how loud the material is over time - not peak level, since an EQ move reshapes transients as well as tone and your DAW's peak meter will still move. The reference is the dry input, taken before R52 does anything, so MATCH compensates for the curve and the drive together as one quantity. Push INPUT hard for color and the loudness stays put, so you hear the texture change on its own. MATCH applies one amount across the whole stereo image and never tilts your balance.

10.2 How MATCH Compensates

MATCH knows the exact curve it is compensating (the same one the SCOPE draws), so it only has to listen for your program material, not work out the correction from scratch - in practice you can sweep, compare, and reject settings quickly without waiting for level to settle. Compensation is internal and silent: OUTPUT doesn't move, and turning it up a decibel makes the track a decibel hotter regardless of MATCH. The SCOPE curve shows the tone shape only and doesn't raise or lower with signal level, so the compensation never appears on the curve.

10.3 Committing to OUTPUT

Turning MATCH off bakes the current compensation into the OUTPUT knob in the same instant - no level jump, and the setting becomes plain, visible gain from then on. Turning MATCH back on resumes internal compensation without double-counting. Only your own click on the MATCH button ever writes to OUTPUT: preset loads, A/B flips, and session recalls never rewrite it or discard what MATCH was holding:

Event	What happens
You switch MATCH off	current compensation baked into OUTPUT, seamlessly
You switch MATCH on	compensation resumes internally; no knob is touched
Preset load, A/B flip, session recall	MATCH state follows the loaded state; OUTPUT is never rewritten and no compensation is destroyed behind your back

10.4 When to Leave MATCH Off

When the level move is the point. A bass lift meant to make the track bigger, not just rounder, needs MATCH off - otherwise it takes the level change away from you.

When you are gain-staging into the next device. Set levels by ear and by meters with MATCH off, or commit first so OUTPUT shows the true figure downstream.

When you have decided. MATCH is for evaluating, not for the final signal path, and it isn't automatable. Turn it off before you bounce - if MATCH is engaged during render, its loudness compensation is printed onto the file instead of being committed to OUTPUT.

SCOPE

SCOPE draws the curve the circuit has produced: the shape you built for the material to pass through. Open it when a move has gone further than you meant and you want to see where it came from, or when BASS and TREBLE are fighting over the middle. The trace follows your settings, not what the material is doing this second.

The SCOPE button on the top bar opens a separate floating window, one per instance, that remembers its position, size, and settings.

11.1 The Two Kinds of Trace

The bold trace is what you hear - every control that shapes the curve, composited, including LOAD when it is engaged. The two faint traces behind it are BASS and TREBLE on their own. The gap between the faint traces and the bold line is where the two controls interact.

11.2 FLAT: The Zeroed-Controls Trace

The FLAT toggle (bottom left) draws a dashed ghost of your settings with BASS and TREBLE zeroed: SOURCE, SHELF and LOAD alone. Use it when the top or the low mids surprise you, since the gap between ghost and bold line is your tone move. Expect the ghost to have shape, most of all in the 1957 circuits, where SHELF moves the whole top end on its own.

11.3 The Red Dot

While TREBLE is off flat, a red dot on the frequency axis marks where the treble move has shifted the response by 3 dB - the point where it becomes plainly audible. It isn't the shelf corner, and it slides down the band as you push TREBLE further. With TREBLE flat, or a move too small to reach 3 dB, there's no dot. Switching VERSION moves the dot noticeably, since 1952 and 1957 have very different treble reach.

11.4 Reading the Plot

Hovering anywhere over the plot shows frequency and dB at that point on the bold curve, snapping to the curve automatically - the number comes from the circuit evaluated at that frequency, not read off the drawing, so it always matches the line. A caption line

along the top acts as a legend by default (bold = what you hear, faint = each tone knob alone, red dot = where treble starts to bite), and switches to explain whatever SCOPE control the mouse is over.

11.5 Window Controls

ZOOM, top left, steps the vertical scale through ± 24 , ± 12 , ± 6 , and ± 3 dB - click to zoom in, right-click to zoom out. Full scale shows the shape of a big move; the tight end reveals sub-decibel moves that are audible but invisible at full scale. At a tight zoom, a large lift running off the top of the window is the window running out of room, not the curve leveling off. PIN, top right, keeps the window above others, useful on a second screen.

11.6 The Meter Rail

Down the right side of the window:

Left bar: DRY or IN	DRY is the default: your signal exactly as it arrives, before R52 touches it. Click the label and it becomes IN: the level after the INPUT knob, which is what drives the valve.
Right bar: OUT	What leaves the plugin.
MATCH line	The live amount MATCH is applying, in dB, whenever it is engaged; MATCH OFF otherwise.

DRY against OUT shows what the instance is doing to your level overall; IN against OUT shows how your drive setting relates to the output.

Both bars read RMS, so they tell you how loud the track is rather than how high its peaks reach. The scale runs from +6 down to -48, marked every 6 dB, and every 3 dB through the working range between +6 and -18 where mixed program sits. The bright line across each bar holds the highest reading for a moment, so a quick move stays visible after it has passed.

Because the bars are RMS, your host's peak meter will read higher, often by 5 to 15 dB depending on the material. Use this rail for gain staging and for judging your level against the dry. Use the host's meters to decide what you are handing to the next device.

CHAPTER TWELVE

CHANNEL MODE AND ISOL

CHANNEL MODE decides which part of the stereo image this instance works on. Click to step through five positions:

Position	This instance processes
STEREO	both channels: the whole image. The default on every fresh insert
MID	the center of the image, where the vocal, kick, snare and bass usually sit
SIDE	the spread: the width, the ambience, the doubles, everything that makes stereo stereo
L	the left channel alone
R	the right channel alone

Whatever the position, the output is always the full stereo picture - the part this instance doesn't own passes through unprocessed and time-aligned, so narrowing the instance narrows what your knobs touch, not what you hear. In any component mode - MID, SIDE, L, or R - you hear the reconstructed stereo: your processing in context with the parts this instance doesn't own, not that channel alone. To hear only the component you're working on, press ISOL.

12.1 Mid/Side and Dual-Mono

A single instance can only process one part of the image at a time - you cannot run MID and SIDE, or left and right, from one instance. For Mid/Side work, run two instances: one set to MID, one to SIDE, the way you'd patch two mono units into an M/S chain. One panel carries one set of knobs because each instance gets the full instrument to itself - its own circuit, SOURCE, LOAD, drive, MATCH, SCOPE and A/B. The same pattern covers dual-mono, with one instance on L and one on R.

The mode lamp is amber when the image is whole (the default state on every R52 lamp); MID/SIDE share one color and L/R another. In MID, the working valve is labeled MID and the idle valve goes dark, since only one is doing anything.

12.2 Bus Widths

On a true mono bus the button reads MONO and doesn't cycle. On a bus wider than stereo it reads MULTI and locks, processing every channel. The five positions only appear on a stereo bus.

12.3 MATCH and Presets in Component Modes

MATCH holds the loudness of what leaves the plugin - the recombined stereo - not just the component you are processing. A large side move is compensated on your half; the untouched half isn't disturbed.

NOTE: A preset saved while in MID, SIDE, L, or R carries that role, and loading it sets the mode along with the tone. A preset saved in STEREO carries no routing opinion and leaves the instance's mode alone. The startup Default never carries routing. The mode itself saves and restores with the session, and is not automatable - routing is patching, not a performance move.

12.4 ISOL

ISOL is the audition button. While lit, you hear only the component this instance processes, on both speakers, with your full move applied - circuit, drive, EQ, and MATCH. The button flashes the whole time it is active.

Typical use: make a move in context, press ISOL to confirm it did what you meant on the component itself, release, and judge again in context. The component arrives at ISOL at exactly the level it has inside the recombined output, so nothing jumps when you toggle it.

ISOL is also how you route a single component to what comes next - while held on, only that component leaves the plugin. It saves and restores with the session (so a chain depending on it keeps working) but never travels in a preset and can't be automated.

Outside a component mode, ISOL is dimmed and inert. If the mode leaves MID, SIDE, L, or R for any reason, ISOL clears itself.

A/B

Beside the preset name sits a three-cell strip: A and B as a pair, and a third cell reading A ▶ B or B ▶ A. These are R52's compare slots - two temporary places for two settings, so your ears can move between them.

The live settings are always the active slot. Whatever the panel shows right now is what the lit cell holds. Flip, and the settings you are leaving are stashed while the other slot's settings take the panel.

13.1 Switching Slots

Either cell flips to the other slot - you don't have to aim at the specific one you want. The help strip announces which slot you land on and its name.

On a fresh insert, both slots hold the preset that loaded with it, so A/B never jumps to an empty or unfamiliar state. If you haven't changed anything, flipping changes nothing, since the slots match.

13.2 Copy and the Safe Workflow

The third cell copies the live slot over the other, labeled with the direction before you commit (A ▶ B while A is live, and vice versa). This turns A/B into a method: dial in a sound you trust, copy it so the trusted version is parked in the other slot, then push further - more treble, a different SHELF, harder drive, another circuit - and flip to compare. If the push is better, copy again and keep going; if not, the trusted sound is one click away.

NOTE: Copy has no undo, which is why the direction is always labeled before you click.

13.3 What a Slot Carries

A slot is a complete sound - every control that shapes what you hear, including VERSION. Two things never travel with it.

Never in a slot	Why
CHANNEL MODE	a flip must never re-route the session. A MID instance stays a MID instance whatever the slots hold
IN/OUT	a flip must never bypass the plugin. Comparing against bypass is IN/OUT's own job

13.4 Presets and the Slots

Loading a preset lands it in both slots at once, so the flip starts level and everything A/B tells you afterward is about what you did to the preset. SAVE writes the slot you are currently on. Anything you want tomorrow goes into a preset today: the slots are working storage, and a reopened session brings back what was saved, not what was parked in the other slot.

SESSIONS, HOSTS, AND AUTOMATION

Save the session, reopen it later, and R52 comes back exactly as you left it.

14.1 What the Session Saves

The session saves every parameter as values - the actual positions, not a reference to a preset file, so renaming, reorganizing, or deleting presets doesn't affect sessions built from them.

Per instance it also remembers the window (including its size), the SCOPE (open/closed, position, PIN, ZOOM, FLAT, and the DRY/IN meter setting), ISOL if it was active when you saved, and the preset name. The hover-help toggle is a machine setting, not session state - it applies to every R52 instance on that computer until you change it again.

14.2 A/B Starts Level

Both A/B slots come back holding the sound you saved, so the first flip lands on the same sound. Make a move, then flip to hear where you started.

14.3 Automation

Each control below appears in the host's parameter list under the name you would guess. Nothing is numbered, nothing is cryptic:

On the panel	In the host's list	Rides a lane
BASS	Bass	yes
TREBLE	Treble	yes
SHELF	Shelf	yes
SOURCE Ω	Source Ohms	yes
INPUT	Input dB	yes
OUTPUT	Output dB	yes
IN/OUT	In/Out	yes
LOAD	Load	yes
MATCH	Match	no
VERSION	Version	no
CHANNEL MODE	Channel Mode	no

IN/OUT is latency-matched, so nothing shifts in time when automated. Three controls don't automate: MATCH is for listening while you decide, not part of the final sound - automating it would move the level under everything downstream; VERSION replaces the circuit, a decision made between takes, not during one; and CHANNEL MODE is routing, not something you ride mid-mix. All three still save and restore with the session - they just don't take an automation lane.

ISOL isn't in the list at all: it is not a host parameter, so it can't be switched by automation or a stray controller assignment during a render. What you hear with ISOL on is what a render prints.

14.4 Renders

Bounce normally: latency lines up on its own, and the same session rendered twice gives identical files. If two renders of a mix differ, the reason lives elsewhere in the chain.

Above 96 kHz, AMP prints in freezes, renders, and exports even though live monitoring uses the LOAD path. See Section 7.8 for the workflow.

PART IV • IN PRACTICE

RECIPES

Every move in this chapter was made at the desk, during the listening sessions that voiced R52, and kept because it survived them. None is a setting - only a starting position and direction; the readouts make any of them exactly recallable once your ears have finished the job. Each recipe names a VERSION, because the circuit decides more than any knob position does.

15.1 Punch on a Bass Without Boosting

Stay in **1952**. Leave BASS and TREBLE alone and reach for **SOURCE**: come up from 600 Ω into the low thousands.

What to listen for: the boxiness in the low mids thinning while the weight underneath holds firm. Nothing is boosted; the contrast between the two simply grows, and that reads as punch and definition. By the 10 k Ω mark the focus is still moving upward. Past it the pluck attack starts to blur, and that is the sign you have left definition and entered color. SOURCE gives up a little level as it rises, so bring the level back before you judge: loudness flatters punch.

15.2 Weight

1952, SOURCE at 600 Ω , and push **BASS** decisively. This control stays musical right up near the top of its travel, and at 600 Ω the circuit is unloaded and open.

What to listen for: richness and weight below the notes, a shelf that keeps growing under the material rather than a bump sitting on it. This is the bottomless low end the rest of this guide keeps mentioning, and it arrives clean.

15.3 Punch With a Bounce

Flip to either 1957 position and give BASS a small lift. Small is the recipe: the character is there almost immediately, well before the knob has traveled far.

What to listen for: a defined hump on the fundamentals of bass notes with the mud pulled out from underneath, punch with a soft bounce to it. The same small move in 1952 grows the whole low end instead. Flipping between the two with the lift in place is the fastest way to hear what VERSION is for.

15.4 A Big Treble Lift and How It Finishes

1952, with **TREBLE** taken well up: around +0.7 is a serious lift and the dial is usable there. Then let **SHELF** choose the top. At the rising end (counterclockwise, the glyph that keeps climbing) the lift stays bright: glossy, crystal, the published sliding lift. Clockwise, the lift corners into a shelf: smoother, a touch more presence, and far less top-octave glare at the same **TREBLE** position.

What to listen for: hi-hats and cymbal tails. Both ends are Baxandall's own published conditions and neither is the correct one. The rising end keeps the sparkle, the shelving end trades it for ease, and with the top shelved the balance of the whole instrument reads lower. Choose the family per job, not once forever.

15.5 Keep the Top When Leaving 1952

At the same knob position, the 1957 circuits deliver roughly a third of 1952's treble lift. Flip **VERSION** mid-session and the top reads as gone. It is not gone: the control has different authority now.

Push **TREBLE** further and read the dB in the help strip rather than the angle on the dial. What to listen for: the 1957 lift arrives higher up and more gently, presence rather than reach. Expect to sit noticeably further along the dial for the same felt brightness.

15.6 Compare the Circuits, Not the Drive

At equal **INPUT**, the 1957 circuits run their valve much harder than 1952 does, so an A/B between the eras is hearing two things at once: different curves and a harder-working valve.

To hear the networks alone, flip between 1952 and 1957 **ALT**, the pair that shares a valve, and trim **INPUT** down in 1957 **ALT** until the two lamps match. Neither comparison is the wrong one: equal **INPUT** compares the two instruments as built, equal glow compares the two tone networks. Know which question you are asking. And leave the lamps out of any judgment between the two 1957s: they read headroom, not character, and they do not compare across valves.

15.7 Starving the Source Impedance

1952. Run SOURCE out past the 10 k Ω fence, toward 39 k Ω and beyond, and let it misbehave: attack blurs, the balance tilts, the level falls away. Then bring the level back with OUTPUT, or with INPUT if you want the valve working harder as well.

What to listen for: a different instrument at the same loudness: softer-fronted, tilted, period. Gain cannot undo a shape change, and that irreversibility is why the far side of the fence is a palette rather than a fault.

15.8 The Tighter of the Two 1957s

When the 1957 network is the right circuit but the bass is thickening, switch the valve.

1957 ALT runs its low end about three times cleaner, so note attacks keep their articulation. **1957** thickens them and carries more color everywhere: the circuit as he published it.

What to listen for: the front of bass notes. The axis between these two is more and less, not harsher and softer. Pick by how much of the same character the material wants.

CHAPTER SIXTEEN

GAIN STAGING

Internal processing is 64-bit floating point throughout, so there is no internal resolution to protect and no digital reason to stage levels into the plugin. Set INPUT for the sound you want, not for a number.

In most plugins gain staging is housekeeping. In R52 it is part of the sound, since level through this circuit is a tone decision before it is a level decision.

Control	Job	Details
INPUT	how hard the circuit is driven: a tone control	Chapter 5
OUTPUT	how loud R52 leaves: a level control, nothing else	Chapter 5
MATCH	holds your loudness steady while you decide	Chapter 10

INPUT isn't a trim in front of an EQ - the valve is inside the feedback loop, so turning INPUT turns the character. OUTPUT changes level and nothing else. Keep those two roles separate and this chapter is mostly done.

Headroom and Clipping

Push INPUT as far as the material wants. The character thickens in proportion all the way up, with no threshold where something else steps in, so a hot setting is a color you chose. The ceiling that matters is downstream: read the OUT bar and set OUTPUT for it. That call belongs at the desk, not inside the instrument.

Trading Drive Against Level

Two ways to change drive without changing loudness:

SHIFT-drag. Hold SHIFT and drag INPUT, and OUTPUT counter-moves by the same amount, so the drive changes and your loudness does not. The point of doing it this way is that both knobs move in plain sight: there is no hidden compensation anywhere in this plugin, and what the panel shows is what is being applied.

MATCH holds perceived loudness steady while you push INPUT, flip versions, or compare against bypass, so tone wins the comparison instead of volume.

Where It Sits in a Chain

There is no required position for R52 in a chain - track, bus, or mix all work. What matters is that whatever sits ahead of it is effectively holding R52's drive knob too: raising an upstream device's output drives R52 harder, intentionally or not. Set upstream gain first, and re-check INPUT if it changes later. And make the tone decision on the level the track actually runs at, not a soloed pass at a different level.

Feeding the Next Device

Nothing touches your level except OUTPUT and MATCH's contribution when engaged - no makeup stage, no hidden correction. To judge what you are handing downstream, open SCOPE and read the meter rail: the OUT bar shows what leaves the plugin. Since tone moves carry level with them (a serious BASS lift is a louder track), check OUT after a tone move and adjust OUTPUT accordingly.

The valve lamps show how hard the circuit is working; the meter rail shows what the rest of the session receives. Gain staging in R52 is answering both on purpose.

PART V • HOW IT WORKS

THE CIRCUIT AND THE VALVES

Two questions bring engineers to this chapter, and they are really the same question: *why does a bass move change the mids too, and why does this feel different from a parametric even when the SCOPE shows a similar curve?* The answer is where Baxandall put the network.

AMP extends the LOAD path with an amplifier stage after the tone control. Its character is available with every VERSION setting, so choosing a circuit voicing and choosing AMP are separate decisions.

The EQ You Already Know

A parametric is a row of independent filters - each band reshapes its slice of the spectrum and hands the result on, with no band aware of the others. That independence is the point, and it is exactly what surgical work needs.

The classic alternative is a passive shelf pair with a makeup amplifier behind it: the network filters what passes through, and the amplifier restores the loss afterward. Different sound, same architecture - filter first, amplifier after. In both designs the amplifier sits outside the EQ, processing whatever the filtering left.

What Baxandall Did Instead

In October 1952, Baxandall put the tone network inside a one-valve amplifier's negative feedback path. The network sits between the amplifier's output and input: everything the amplifier produces comes back through the network as a report on its own output, weighed against what's arriving at the input. The amplifier drives its output continuously to keep the two in balance.

Turn a knob and you haven't filtered the signal - you've tilted the report. Where the network under-reports the output, the amplifier pushes harder (your boost); where it over-reports, the amplifier eases off (your cut). What you hear, at every setting including flat, is the amplifier's output and nothing else. The knobs change what the amplifier is asked to do, not the signal directly.

Why Bass Reaches the Mids

There is one network, not two bands. The bass and treble arms meet at the same point in the same network, so each changes what the other is working against. The SCOPE shows this: the bold trace is the one curve the circuit settles into, and the faint traces show what each knob would produce alone. Moving BASS re-tilts one end of a single curve, which the circuit then resolves as a whole - the middle moves because it belongs to the same curve, not because of crosstalk between separate bands. This interaction can't be switched off because it isn't an implementation detail; it is the shape of the instrument.

Why the Amplifier Is Inside Every Setting

Since the feedback loop is the EQ, the amplifier is not a stage after it - it is one of the things the curve is made of. Its strength and limits sit inside every setting, which is why drive and tone are entangled here in a way they are not on a parametric. Boosting treble asks the valve to swing harder exactly where you boosted.

Why R52 Models the Amplifier

Copy the published curve into a modern filter and you have half the instrument. The shape arrives; the behavior does not. The interaction has to be faked or dropped, drive and tone come apart, and the valve becomes a separate coloring stage bolted on after: precisely the architecture Baxandall's design is not.

So R52 is built as the loop: the network solved as a circuit, with the amplifier, valve and all, sitting inside it where Baxandall put it. Not because the history deserves a museum, but because the loop is the only place the sound described in this guide actually comes from.

Your parametric	This circuit
independent bands, added together	one network, one solved curve
the filter shapes the signal	the knobs steer the amplifier
color, if any, is a stage after the EQ	the amplifier's character is inside every setting

That is the whole answer. A parametric filters the signal. This circuit tells an amplifier what to be.

Two questions come up early: why does a treble boost sound more colored as well as brighter, and where's the clipping point, since pushing harder never finds one? Both answers come from the valve and the feedback loop around it.

What a Boost Asks of the Amplifier

The tone network sits in the feedback loop around the valve, so a tone setting isn't a curve applied afterward - it is a change in what the loop demands from the valve at each frequency. Boosting treble asks the valve for more swing at those frequencies, which is where the lift comes from, and more swing carries more of the valve's character on exactly the frequencies you raised. Cutting relaxes the valve where you cut, so that region comes back cleaner as well as quieter.

Tone and drive are one system here, not an EQ followed by a saturator. If you want the same EQ shape with less character, hold SHIFT and drag INPUT down - OUTPUT counter-moves to hold loudness while the valve backs off.

Why There Is No Clipping Point

The valve's curve has no corner - it bends smoothly at every level, with distortion tracking the signal in proportion across an 80 dB range. There's no threshold to stay under and no sweet spot to hunt for; every level sits on the same smooth slope, so drive it where the music wants it. The lamps show how much of the valve's swing is in use, not a warning to avoid.

The Pentode and the Triode

VERSION's two 1957 positions are one network with a choice of valve: the SP61 pentode from 1952, or the ECC81 triode Baxandall specified. Both valves bend the same way - the difference is how much gain each brings to the loop, since gain is what the loop spends correcting the valve's own bending. The pentode brings much more gain, so the triode lets roughly three times as much of the same character through, with an identical harmonic profile.

The choice is an amount, not a kind: no smoother valve, no harsher one, just more or less of the same thing. Use 1957 to hear the network as published, color included; use 1957 ALT for the same curves with a cleaner low end.

One clarification: 1952 isn't a third point on this scale - it is a different network around the same pentode, and the network is the bigger difference. VERSION replaces the circuit, not just the valve.

Which Valve the Panel Draws

Each channel's plate carries one valve icon, following VERSION. In 1952 and 1957 ALT it is the SP61's opaque metal can; in 1957 it is the ECC81's clear glass, showing two plate structures since an ECC81 is a double triode. Only the left plate ever lights - that's the half in the tone loop. The right plate is the other half of the valve, which Baxandall's 1957 preamplifier used for a plain amplifier stage R52 doesn't model, so it is drawn but never lit.

How It Was Checked

The preface makes a large claim: this is the circuit. Here is what that was checked against.

The Two Checks

Baxandall published response curves alongside his schematic, and those figures are R52's reference. The check ran two ways: R52's solved response was laid over his published curves point by point, and separately, the same network was given to an independent circuit simulator with no knowledge of R52's engine, and its curves were compared against R52's.

Why No Commercial Product Was Measured

No commercial product was targeted or measured. That's not restraint - there's nothing to target: no commercial unit of this circuit was ever built, mono or stereo. It lived as a published design, built by its readers. When R52 disagrees with another Baxandall-derived product, that's not a defect in either - they answer to different references. Choose between them by ear.

Check the Shape Yourself

The SCOPE draws the same solved curves the audio passes through, not an illustration. The original articles are freely available (Appendix A) - set the panel to match a published figure and compare the SCOPE's trace against the printed curve yourself.

What Listening Checked

The curves establish that the shape is his; they don't establish that the instrument is worth using, which no measurement can. That part was checked by listening, on program material, with decisions made by ear and kept. What survived those sessions is what shipped.

PART VI • HISTORY

MALVERN, OCTOBER 1952

The circuit in R52 arrived in the world as a magazine article: *Wireless World*, October 1952, “Negative-Feedback Tone Control,” by Peter Baxandall, an engineer working at Malvern. When VERSION reads 1952, that article is what’s running - the published circuit, built and operated under the conditions he specified, not a descendant or a product inspired by it.

What He Published

The ordinary tone control of the day was passive: it shaped sound by throwing signal away and relied on a separate amplifying stage to make up the loss. That stayed standard practice for years afterward. Baxandall’s October article put the tone network inside the amplifier’s feedback loop instead, so the valve was part of how the network behaved rather than cleanup after it. Flat was unity, boost and cut mirrored each other, and one stage did the whole job. The article was complete - circuit, valve, every component value, and the reasoning, including the source condition R52 now puts on a dial.

The Correction

A month later he published a correction. Most of it pinned down printed part specifications, but one item did more: the October article had drawn two families of treble curves, his preferred rising family in full lines and a shelving alternative dotted. The November correction published the arrangement that produces the shelving family.

He was clear that he preferred the rising shape but considered the question genuinely contested, and in January 1955 his next design put that choice on a front-panel switch. On R52, in 1952 mode, that argument is the SHELF dial - counterclockwise is the October article, clockwise is the November correction, and the continuous ground between them is R52’s.

As the circuit was redrawn and copied over the following decades, this tapped detail fell away - by 1974 the trade press was drawing the circuit as a bare amplifier triangle with no valve, no values, and no citation. R52 restores the choice.

Why It Spread

Nothing was sold. The circuit cost the price of the magazine, was complete enough to build straight off the page, and did in one stage what standard practice split across two.

The spread took longer than the legend suggests - the circuit didn't sweep the valve era it was born into, since passive networks stayed the norm and the famous valve preamplifiers of the time used a different feedback approach. The real conquest came with transistors and op-amps: by 1974 the same magazine was calling the configuration "the almost universal choice" of manufacturers, drawn without a source. What propagated was the article's proportion - boost and cut mirrored about unity - rather than the circuit itself, rebuilt by others in their own parts and impedances.

Baxandall's Published Record

October 1952	"Negative-Feedback Tone Control": the complete circuit, and the reasoning
November 1952	the correction, carrying the alternative shelving arrangement
January 1955	his next design puts the rising-or-shelving choice on a front-panel switch, left to the builder
May 1957	the network re-voiced, inside a preamplifier design: Chapter 20

The modern engineering canon still cites his work from as late as 1980–81, on active volume control and RIAA equalization, long after his surname had become an adjective.

He stated his preference and published the alternative anyway; he corrected his own work in print within a month; he left contested questions to the builder rather than settling them by omission. SHELF exists because he published both answers, and this guide names whose ground you are standing on because he did the same.

R52 is not affiliated with, endorsed by, or connected to Peter Baxandall or his estate. The project's entire relationship with him is the printed record, listed in Appendix A; the formal statement is in Appendix B.

CHAPTER TWENTY

1957, THE VERSION ALMOST NOBODY BUILT

The previous chapter covered a famous paper; this one covers its opposite: a circuit by the same man, in the same magazine, that went unseen for most of seventy years - the other half of the VERSION button.

One Page, Under the Wrong Heading

Wireless World, May 1957, page 209, titled "Inexpensive Pre-Amplifier." Baxandall never published a second tone-control paper, but designing this preamplifier he redrew the network with new values and a component absent from the original, so it would deliver gain instead of unity - his own second voicing, published inside someone else's problem, which is why almost nobody has seen it.

What the Gain Bought

He wasn't fixing the 1952 circuit - nobody had complained. Giving the tone stage gain meant the stage feeding it only had to deliver a small signal, distorting very little even without its own feedback, while the tone stage (which does have feedback) supplied the level at similarly low distortion. Very low total distortion, bought cheaply, was the point; saving a valve was secondary.

He named the price himself, in the same paragraph: reduced treble lift, and bass lift reduced too, to a lesser degree.

The Price, Named in the Same Paragraph

He states the cost right where he makes the change: the price is "a reduction in the available amount of treble lift", and bass lift is reduced too, to a lesser degree. Nobody discovered the trade later, and nobody needed to. He traded available lift for gain and lower distortion in the tone stage, said so in print, and considered it a good bargain.

What the Trade Sounds Like

Flip VERSION with a treble lift dialed in and you hear the bargain immediately - the lift arrives more gently and higher up, while the bass turns over instead of running away. What he traded away stays traded away; the trade is the character.

Why It Went Unnoticed

No commercial implementation of the 1957 network has been found, and the standard literature doesn't cite the article at all - only October 1952. The reason is ordinary: the redrawn network appeared as one stage of a budget preamplifier, filed under preamplifiers, and nobody surveying tone-control designs had reason to open it. It wasn't rejected, just neglected.

How R52 Ships It

The 1957 position is the article's circuit: his second voicing with the ECC81 double triode in its loop, as published. The 1957 ALT position beside it is the same network fitted with the 1952 pentode instead. That pairing appears in no magazine. Baxandall never built it, and neither the panel nor this guide presents it as history: it is an R52 extension, kept because it widens what the instrument can do without touching the published network.

So read the button as two circuits, with a choice of valve on the later one. The history in this chapter belongs to 1952 and to 1957. ALT belongs to us.

That is the whole story. A real Baxandall, published once, filed under the wrong heading, never taken up, now sitting one click from the 1952 circuit whose shape spread everywhere. The source, if you want to read past the title yourself, is *Wireless World*, May 1957, page 209.

WHAT THE INDUSTRY ACTUALLY BUILT

You've probably used a Baxandall EQ for years, on a console or in a plugin. A fair question is whether R52 is that. It isn't, and this chapter is the record of what actually traveled out of the 1952 article.

The Shape Traveled

What spread was the article's proportion: two matched arms around an inverting amplifier, unity in the middle, boost and cut mirroring each other, shelves rising toward the band edges. Any amplifying device completes the arrangement, which is exactly why it conquered - but almost nothing else made the trip. Impedances scaled down roughly a hundred to one as valves gave way to transistors and op-amps; capacitor choices varied by maker.

Traveled with the name	Stayed on the page
the proportion: boost and cut mirrored about unity	the component values, at their original impedance scale
shelves that keep rising toward the band edges	the SP61 pentode, and an amplifier that is part of the EQ
an inverting stage at the center; any device completes it	the stated condition on what may drive the network (Chapter 6)

By the time most of the industry built the circuit, the name had detached from the papers entirely - what propagated was the gain structure on whatever device was current.

A Name That Outran the Papers

By 1974, *Wireless World* itself ran "Baxandall tone control revisited" (M. V. Thomas, September 1974), which called the configuration "the almost universal choice" of manufacturers, drew it as a bare inverting triangle with no device or values, used "Baxandall" purely as an adjective, and cited neither of his papers. Twenty-two years on, the name needed no source - the largest compliment a trade pays a circuit.

The 1957 voicing never entered that stream at all - no commercial schematic copies it, and the literature doesn't cite it. The silence is specific to that circuit, not to the man: the

same literature cites his later work freely, and the famous gain-bearing Baxandall circuit is his 1980 active volume control, a different design for a different job.

The Valve Era

Valve hi-fi wasn't ruled by this circuit from 1952 onward. Mullard's own flagship designs kept tone controls passive through at least 1963, and celebrated valve preamps like the Marantz 7, Dynaco PAS, and Quad 22 used a different feedback approach entirely. The circuit is near-universal reign begins with transistors and op-amps - by the time the triangle was everywhere, the valve inside it was long gone.

The Baxandall You Have Used

The tone control you know is the 1952 proportion on modern devices at modern impedances, fed from a buffer, into a light load. It behaves beautifully, which is why it is everywhere, and nothing here is a criticism of it - it kept the half of the article that survives any device. Set beside the 1952 article, the other half is this guide's subject:

The amplifier is part of the EQ. The article places the network in the negative-feedback path of an SP61 pentode, so the valve's behavior is inside every curve. Descendants keep the network but choose amplifiers whose character stays out of the way.

The source is part of the EQ. The article states a condition on what may drive the network, and the curves change when it is violated. A modern buffer satisfies that condition silently; R52 puts it on a dial.

The lift keeps climbing. The 1952 treble rises past the top octave, and R52 keeps that behavior while offering the shelving choice Baxandall himself published.

Where R52 Stands

What spread was the shape of the circuit; this is the circuit. R52 revives the network, the SP61 in its feedback loop, and the stated conditions around it, placed under your fingers rather than assumed away. It models no product in that lineage - the reference is the October 1952 article and its correction, nothing else.

SEVEN OHMS

This guide ends on a loudspeaker because the signal did. In 1952 nobody heard a tone control alone - the signal left Baxandall's network, picked up power in an amplifier, and reached a loudspeaker. R52 keeps both ends of that chain on the panel: SOURCE is the first, LOAD is the last.

The Little Monitor

The loudspeaker behind LOAD is the LS3/5A, the BBC's miniature monitor - a sealed box of about five liters, nominally 15 ohms, designed by the BBC's own research engineers. It is a mid-1970s design, and pairing it with a 1952 circuit is deliberate: the tone control outlived the loudspeakers of its own decade, so a monitor from later in its working life shows it through a better window.

Harwood's Remark

The LS3/5A's research report, written by Harwood, notes that its small sealed enclosure overdamps the bass unit - held at perfect grip, the low end stops sooner than it needs to. The report names two ways to extend the bass: one traded away sensitivity, and the other was to feed the loudspeaker from about seven ohms and redesign its internal network to suit. Harwood set both aside, and the LS3/5A shipped voltage-driven, held as tightly as amplifiers of the era could manage. The seven-ohm idea appears once, in prose, as a road considered and not taken.

What R52 Applies, and What It Leaves Out

LOAD's 7.0 Ω setting picks up that remark, applying half of it: the seven-ohm feed, without the network redesign Harwood paired with it, since the modeled loudspeaker is the one that actually shipped. That's why 7.0 is the boldest position on the dial - bass blooms as intended, but the rest of the balance moves further than Harwood's full proposal would have allowed.

Amplifier Ohms, Not Speaker Ohms

One misreading is worth killing here. The ohms on the LOAD dial are the amplifier's, never the loudspeaker's. A reader raised on 4-ohm and 8-ohm speakers will see LOAD 7.0 and read a speaker rating; it is not one. The monitor in the model is nominally 15 ohms at every position of the dial. What the dial sets is the output impedance of the amplifier holding it: how tightly it grips, and smaller is tighter.

Read the dial as the story above. **OFF** is a modern amplifier, perfect grip and no color, an exact bypass, and also the condition the LS3/5A actually shipped in. Each step up loosens the hold, moving the monitor away from how the BBC delivered it and toward how Harwood almost proposed it, until at 7.0 the amplifier holds a 15-ohm loudspeaker through nearly half the speaker's own impedance: as loose a grip as anyone of the era put on paper. Of the five steps, only that last one traces to a document. The rest are R52's working positions on the way there.

That is where this guide stops, because it is where the signal stopped: a small studio monitor, a remark in its research report about how its bass might have gone deeper, and a tone control that had already been working for a quarter of a century when the box was designed. After seven ohms there is only air.

PART VII • REFERENCE

PRESETS

Where the Files Live

Every copy of R52 on the machine reads the same shared folder:

Platform	Preset folder
macOS	/Users/Shared/Pulsar Modular/R52 Baxandall/Presets
Windows	C:\Users\Public\Documents\Pulsar Modular\R52 Baxandall\Presets
Linux	~/local/share/Pulsar Modular/R52 Baxandall/Presets

The folder is shared by every account on the machine, so a studio computer shows one bank to everyone who sits at it. Each preset is a single file with the extension .R52Preset.

The Folder Is the Source of Truth

The browser keeps no copy of anything. It reads the folder, to any depth, and shows what is actually there:

- **Rename a preset in the file manager and it is renamed in the browser; move one into a subfolder and it moves; make folders, nest them, reorganize the whole bank, and the browser follows. All of this is live - the browser updates while it is open, so you can tidy the bank in the file manager with R52 running and watch it happen.**

What a Preset Carries

A preset stores the sound and nothing else:

Stored	Which is
BASS, TREBLE, SHELF	the tone
SOURCE, LOAD	the conditions around the circuit
INPUT, OUTPUT	the drive, which is part of the character
VERSION	the circuit itself

Stored	Which is
MATCH	whether compensation is engaged

One thing more is stored conditionally: a role. A preset saved while the instance is in a component mode (MID, SIDE, L or R) remembers that mode and sets it on load. A preset saved in STEREO carries no routing opinion at all and leaves the instance's channel mode alone. The file-level fact is simply that only component-mode saves carry a role.

What a Preset Never Stores

- **Bypass - a preset that switched the plugin off as it loaded would look exactly like a preset doing nothing, which is the worst kind of surprise to diagnose, so loading never touches IN/OUT. A/B slots are working memory, not part of any sound. Window state - loading a tone preset never opens, moves or closes your SCOPE window.**

The Default Preset

A preset named exactly Default in the top level of the bank loads on every fresh insert. It is an ordinary file otherwise: save over it like any other, and delete it to return new inserts to the factory starting point.

23.6 Deleting

Deleting a preset from the browser sends the file to the Trash (the Recycle Bin, on Windows), never into thin air, and asks first, naming the file it is about to remove. Change your mind afterward and the file is sitting where deleted files go, ready to be put back.

Backup, and Moving Between Machines

Backing up your presets means copying one folder. That is the whole procedure, and restoring means copying it back.

The files travel. A preset saved on one machine loads on another, macOS, Windows and Linux alike, so a bank can follow you between rooms or be handed to a collaborator: copy the files, drop them anywhere inside the other machine's preset folder, done.

Installing a new version of R52 leaves your preset folder exactly as you left it.

Pro Tools Preset Management

When using R52 Baxandall in Avid Pro Tools, note that Pro Tools handles plugin preset management differently from most other DAWs. To ensure R52 Baxandall's internal preset system works seamlessly with Pro Tools' own preset management, follow these steps.

Set Plugin Default Behavior

- In the plugin's header bar (top of the plugin window), open the Preset drop-down menu in Pro Tools.
- Navigate to Settings Preferences → Set Plug-In Default to → User Setting.

This ensures that R52 Baxandall recalls your most recent or user-defined settings instead of reverting to the factory default every time the plugin is inserted.

Save Presets to the Session Folder

- Again, open the Preset menu and go to Settings Preferences → Save Plug-In Settings to → Session Folder.

This ensures all custom R52 Baxandall settings are stored within the current Pro Tools session folder, rather than the global root settings directory. This is especially useful when collaborating or moving sessions between systems, as your R52 Baxandall settings will automatically travel with the session.

TIP: Enabling both options allows Pro Tools and R52 Baxandall's internal preset browser to work hand in hand, ensuring consistent recall and a smooth preset workflow across sessions.

INSTALLATION AND THE FIRST INSERT

Install the format your DAW uses: the audio engine is the same code in every one.

Format	Platform	Installed at
VST3	macOS	/Library/Audio/Plug-Ins/VST3/Pulsar Modular/R52 Baxandall.vst3
VST3	Windows	C:\Program Files\Common Files\VST3\Pulsar Modular\R52 Baxandall.vst3
VST3	Linux	~/.vst3/R52 Baxandall.vst3 (or /usr/lib/vst3 for a system-wide install)
AU	macOS	/Library/Audio/Plug-Ins/Components/R52 Baxandall.component
AAX	macOS	/Library/Application Support/Avid/Audio/Plug-Ins/Pulsar Modular/R52 Baxandall.aaxplugin
AAX	Windows	C:\Program Files\Common Files\Avid\Audio\Plug-Ins\Pulsar Modular\R52 Baxandall.aaxplugin
LV2	Linux	~/.lv2/R52 Baxandall.lv2 (or /usr/lib/lv2 for a system-wide install)

Updates install over the top. Run the new installer and it replaces the plugin files in place. It refreshes the factory presets unless you deselect that option; presets you saved yourself are never touched.

Where Presets Live

R52 stores presets as ordinary files, shared by every copy of the plugin on the machine:

<shared documents>/Pulsar Modular/R52 Baxandall/Presets

Platform	Which means
macOS	/Users/Shared/Pulsar Modular/R52 Baxandall/Presets

Platform	Which means
Windows	C:\Users\Public\Documents\Pulsar Modular\R52 Baxandall\Presets
Linux	~/local/share/Pulsar Modular/R52 Baxandall/Presets

If that shared folder isn't writable, R52 falls back to an equivalent folder in your own user area. Presets are per-machine, not per-user, so everyone on a shared studio machine sees the same bank.

The folder is the source of truth. Rename a preset in Finder and it's renamed in R52; drag one into a subfolder and it moves; nest folders as deep as you like. Nothing is hidden in a database, so backing up your presets is copying a folder.

What a Fresh Insert Gives You

An untouched instance is the 1952 circuit and nothing else:

Control	Fresh insert	Meaning
BASS, TREBLE	flat	no shaping
SHELF	the published position	Baxandall's own preferred condition
SOURCE	0 Ω	an ideal driver: no source impedance color
LOAD	OFF	a true bypass: nothing downstream is modeled
VERSION	1952	the original circuit
INPUT, OUTPUT	0 dB	unity
MATCH	off	no compensation
CHANNEL MODE	STEREO	both channels processed

LOAD OFF is a bypass, not a gentle setting, as that stage is out of the signal path entirely.

Setting Your Own Default Preset

If you always start from the same settings, save a preset named exactly Default in the top level of the bank, and R52 loads it on every new insert. The preset browser's right-click menu offers this as "Save these settings as the startup default".

Three things to know: existing sessions are untouched, since a saved session restores its own settings and only new inserts start from your Default; it never changes routing, so new inserts always arrive in STEREO regardless of what channel mode was active when you saved the default; and delete it to go back - if the file is missing or unreadable, R52 falls back to the factory starting point.

24.4 Latency

R52 reports its latency to the host and your host compensates for it automatically, so your tracks stay aligned and you do nothing.

A First Sanity Check

Insert R52 on something you know well, leave every control alone, and toggle IN/OUT. You should hear almost nothing: at rest the network is flat and the valve is transparent at ordinary levels. What remains is a fraction of a decibel of insertion loss, which is the real circuit's behavior, not a fault.

If the two states differ by more than that, something upstream isn't what you think it is.

Linux Notes

- **R52 installs as VST3 and LV2, distributed as .tar.gz and .deb packages. Prefer the LV2 build in Harrison Mixbus; the libraries Mixbus bundles can conflict with the VST3 GUI. Hosts read the LV2 build's parameters as plain numbers, since LV2 has no way for a plugin to supply formatted readouts, while the VST3 build reports formatted values. Presets and the user guide live in ~/.local/share/Pulsar Modular/R52 Baxandall.**

Uninstalling

ON macOS, WINDOWS AND LINUX YOUR PRESETS LIVE INSIDE THE SHARED ‘R52 BAXANDALL’ FOLDER AS PLAIN FILES. COPY THAT FOLDER SOMEWHERE SAFE BEFORE DELETING IT IF YOU WANT TO KEEP THEM FOR A REINSTALL OR ANOTHER MACHINE.

Windows

VST3: OPEN ‘C:\PROGRAM FILES\COMMON FILES\VST3\PULSAR MODULAR’, LOCATE THE ‘R52 BAXANDALL.VST3’ FOLDER AND DELETE IT.

AAX: OPEN ‘C:\PROGRAM FILES\COMMON FILES\AVID\AUDIO\PLUG-INS\PULSAR MODULAR’, LOCATE THE ‘R52 BAXANDALL.AAXPLUGIN’ FOLDER AND DELETE IT.

SHARED: OPEN ‘C:\USERS\PUBLIC\DOCUMENTS\PULSAR MODULAR’, LOCATE THE ‘R52 BAXANDALL’ FOLDER AND DELETE IT. THIS FOLDER CONTAINS THE USER GUIDE AND PRESETS. IF NO OTHER FOLDERS EXIST UNDER ‘PULSAR MODULAR’, THIS CAN BE DELETED AS WELL.

macOS

AU: OPEN ‘/LIBRARY/AUDIO/PLUG-INS/COMPONENTS’, LOCATE THE ‘R52 BAXANDALL.COMPONENT’ FILE AND DELETE IT.

VST3: OPEN ‘/LIBRARY/AUDIO/PLUG-INS/VST3/PULSAR MODULAR’, LOCATE THE ‘R52 BAXANDALL.VST3’ FILE AND DELETE IT.

AAX: OPEN ‘/LIBRARY/APPLICATION SUPPORT/AVID/AUDIO/PLUG-INS/PULSAR MODULAR’, LOCATE THE ‘R52 BAXANDALL.AAXPLUGIN’ FOLDER AND DELETE IT.

SHARED: OPEN ‘/USERS/SHARED/PULSAR MODULAR’, LOCATE THE ‘R52 BAXANDALL’ FOLDER AND DELETE IT. THIS FOLDER CONTAINS THE USER GUIDE AND PRESETS. IF NO OTHER FOLDERS EXIST UNDER ‘PULSAR MODULAR’, THIS CAN BE DELETED AS WELL.

Linux

VST3: OPEN ‘~/VST3’ (OR ‘/USR/LIB/VST3’ FOR A SYSTEM-WIDE INSTALL), LOCATE THE ‘R52 BAXANDALL.VST3’ FOLDER AND DELETE IT.

LV2: OPEN ‘~/LV2’ (OR ‘/USR/LIB/LV2’ FOR A SYSTEM-WIDE INSTALL), LOCATE THE ‘R52 BAXANDALL.LV2’ FOLDER AND DELETE IT.

PACKAGE INSTALL: IF **R52 BAXANDALL** WAS INSTALLED FROM THE **.DEB** PACKAGE, REMOVE IT WITH YOUR PACKAGE MANAGER (FOR EXAMPLE, ‘**SUDO APT REMOVE R52-BAXANDALL**’).

SHARED: OPEN ‘**~/LOCAL/SHARE/PULSAR MODULAR**’, LOCATE THE ‘**R52 BAXANDALL**’ FOLDER AND DELETE IT. THIS FOLDER CONTAINS THE USER GUIDE AND PRESETS.

TECHNICAL SPECIFICATIONS AND PERFORMANCE

The figures below are the reference information most useful when planning a session.

25.1 Latency

Session rate	Latency
44.1 / 48 kHz	91 samples (about 2 ms)
88.2 / 96 kHz	71 samples (under 1 ms)
176.4 / 192 kHz	0 samples

R52 reports these figures to the host, and the host's delay compensation absorbs them automatically. Your tracks stay aligned and you do nothing.

There is one R52. No low-latency sibling is installed alongside it and there is no mode to switch. If the couple of milliseconds matters while you are tracking, do the ordinary thing: keep R52 off the monitor path while recording and put it on when you mix.

IN/OUT is latency-matched. Bypassed and active pass through the same delay, so toggling the button compares tone against tone rather than two different timings.

25.2 CPU

No benchmark is printed here, since a figure from one machine at one buffer size only describes that machine. Measure it on your own system instead: open your DAW's performance meter, insert R52 where you'd use it, and duplicate the instance until the meter tells you something.

Two facts for reading what you see: the circuit is solved once per processed channel, so a stereo instance runs two engines and a mono instance runs one; and processing is 64-bit throughout, with no quality switch and no setting that trades sound for CPU - what you measured is what it costs.

AMP is the most demanding R52 option. Use it on a few important tracks rather than by default across the session. Once a setting is final, freezing the track or using an offline bounce is an effective way to recover CPU.

TROUBLESHOOTING AND FAQ

26.1 The Plugin

Where is the oversampling control? There isn't one - oversampling is always on, sized automatically for your session's sample rate.

Is there a zero-latency or low-latency version? No. There's one R52; your host is told the latency and compensates automatically.

Where is the clean or transparent mode? INPUT is it. The valve sits inside a feedback loop and stays well-behaved at ordinary levels - drive it gently for a transparent sound.

Why aren't the tone controls stepped? The originals weren't either. The readout gives exact recall without steps.

Does it null on a bounce? Yes - same session, same settings, same file.

Is R52 a model of a particular hardware unit? No. It is built from Baxandall's published work; no commercial product was targeted or matched.

26.2 The Controls

I turned SHELF up and lost top end - is it backwards? No, that's correct: clockwise is more shelving, and more shelving is a tamer top.

The same knob position sounds much weaker after I changed VERSION. It is weaker - at the same position, 1952's TREBLE gives roughly three times the lift of either 1957. Read the dB in the help strip, not the angle.

The readout says +700, but the knob only goes to 1. Same position - the knob's printed scale runs -1 to +1, and the readout counts it in thousandths for exact recall: +700 is 0.700 of full travel. Type 700 or 0.7 and you land in the same place.

Engaging LOAD changes the level. LOAD models a downstream amplifier and loudspeaker; loosening the grip costs some level. Turn MATCH on to compensate.

Is 7.0 the speaker's impedance? No - the modeled speaker stays 15 Ω nominal. The dial sets the amplifier's output impedance.

Where is the load control on my real amplifier? Almost certainly not present - it is normally fixed at the design stage.

One valve lamp is brighter than the other. Your material is asymmetric - the lamps show drive per channel, not distortion, and don't compare across the two 1957 voicings.

Where is the second set of knobs for Mid/Side? There isn't one - run two instances instead.

The AMP button is unavailable. AMP requires LOAD to be active. Select any LOAD setting other than OFF. AMP is available on stereo and mono instances; it is unavailable in MID, SIDE, L, and R modes.

The AMP lamp is purple instead of amber. The session is running above 96 kHz. AMP prints during freeze, render, and export, while live monitoring uses the LOAD path. Freeze the track to hear the AMP result in context.

26.3 Presets and Sessions

Where are my presets? In a plain shared folder - rename, nest, and back them up in Finder or Explorer.

I saved a preset in MID mode and it moved another instance into MID. That's expected - a preset saved from a component mode carries that role. A preset saved in STEREO leaves routing alone.

Deleting a preset - is it gone? No, it moves to the Trash/Recycle Bin.

26.4 Modifier Keys and Shortcuts

These are optional speed tools. You do not need them to understand or use R52, but once the instrument is familiar they can make common moves faster.

SHIFT-drag INPUT, and OUTPUT counter-moves by the same amount, so you can change drive while keeping the level steady and hear what the valve contributes without loudness bias. Hold Cmd+Opt on macOS, or Ctrl+Alt on Windows and Linux, while hovering a supported control to hear the plugin as if that control were at its resting position; the knob does not move and nothing is written to automation or the preset. Click a knob's value readout to enter an exact value - BASS and TREBLE accept their faceplate range or the thousandths shown by the readout, and SOURCE accepts values such as 10k. For state controls such as VERSION, CHANNEL MODE and LOAD, click to move forward and right-click to move backward; the contextual help strip identifies the current state. The bottom help strip is the primary quick reference - it changes with the control and, for state-based controls, follows the selected state, so use it instead of hunting through the manual for a definition.

APPENDIX A. PRIMARY SOURCES

Everything historical in this guide comes from documents published openly and still readable today:

P. J. Baxandall, “High-Quality Amplifier Design,” *Wireless World*, January 1948.

P. J. Baxandall, “Negative-Feedback Tone Control,” *Wireless World*, October 1952. The article the instrument revives (Chapter 19).

The erratum to that article, *Wireless World*, November 1952. Publishes the alternative shelving condition reproduced at the far end of SHELF’s travel in the 1952 circuit (Chapter 4).

P. J. Baxandall, “Inexpensive Pre-Amplifier,” *Wireless World*, May 1957, p. 209. Contains his second voicing of the network (Chapter 20).

M. V. Thomas, “Baxandall tone control revisited,” *Wireless World*, September 1974. The trade press’s own record of how the name detached from the original papers (Chapter 21).

BBC Research Department Report 1976/29, on the LS3/5A loudspeaker. Source of LOAD’s 7.0 Ω setting (Chapter 22).

All six circulate freely and have for decades.

APPENDIX B. CREDITS AND INDEPENDENCE

The Name

The product is **R52 BAXANDALL**, subtitled **NEGATIVE FEEDBACK TONE CONTROL** - the title of Baxandall's October 1952 article. "Baxandall" is used throughout this guide as the standard term for the circuit topology, the way the audio trade has used it since at least 1974.

Independence

R52 is not affiliated with, and is not endorsed by, any commercial Baxandall-derived product. No commercial equipment was targeted or measured in its development; R52 was built from Peter Baxandall's published articles.

R52 is likewise not affiliated with, and is not endorsed by, Peter Baxandall's estate. The history chapters, Chapters 19 through 22, are about his published work. Nothing in this guide or in the product implies his involvement in R52, or any endorsement of it by him or by his estate.

Credits

R52 Baxandall is a product of **Pulsar Modular**.

Design & Research: Ziad Sidawi

Plugin Development: Mesut Saygıoğlu

GUI Development: Max Ponomaryov / azzimov GUI design – www.behance.net/azzimov

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Please kindly report any errors or omissions in this user guide to
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