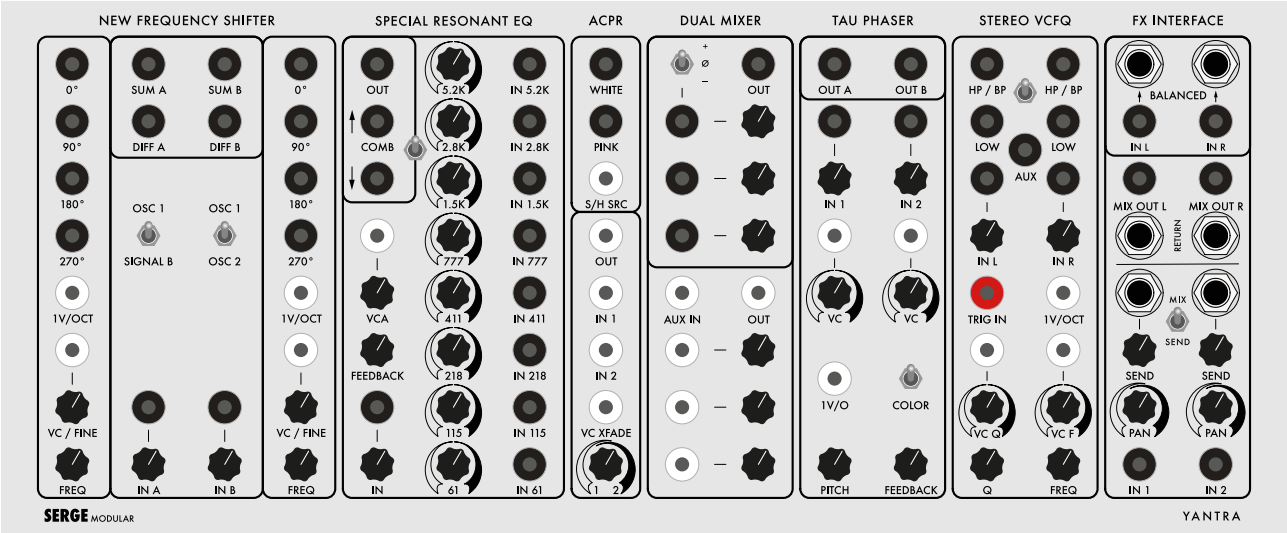
SERGE

YANTRA

USER MANUAL


NEW FREQUENCY SHIFTER
SPECIAL RESONANT EQ
ACPR
DUAL MIXER
TAU PHASER
STEREO VCFQ
FX INTERFACE
0°
90°
180°
270°
1V/OCT
VC / FINE
FREQ
SUM A
SUM B
DIFF A
DIFF B
OSC 1
SIGNAL B
OSC 2
IN A
IN B
OUT
COMB
VCA
FEEDBACK
IN
5.2K
2.8K
1.5K
777
411
218
115
61
IN 5.2K
IN 2.8K
IN 1.5K
IN 777
IN 411
IN 218
IN 115
IN 61
WHITE
PINK
S/H SRC
IN 1
IN 2
VC XFADE
AUX IN
OUT A
OUT B
VC
1V/O
COLOR
PITCH
FEEDBACK
HP / BP
LOW
AUX
IN L
IN R
TRIG IN
VC Q
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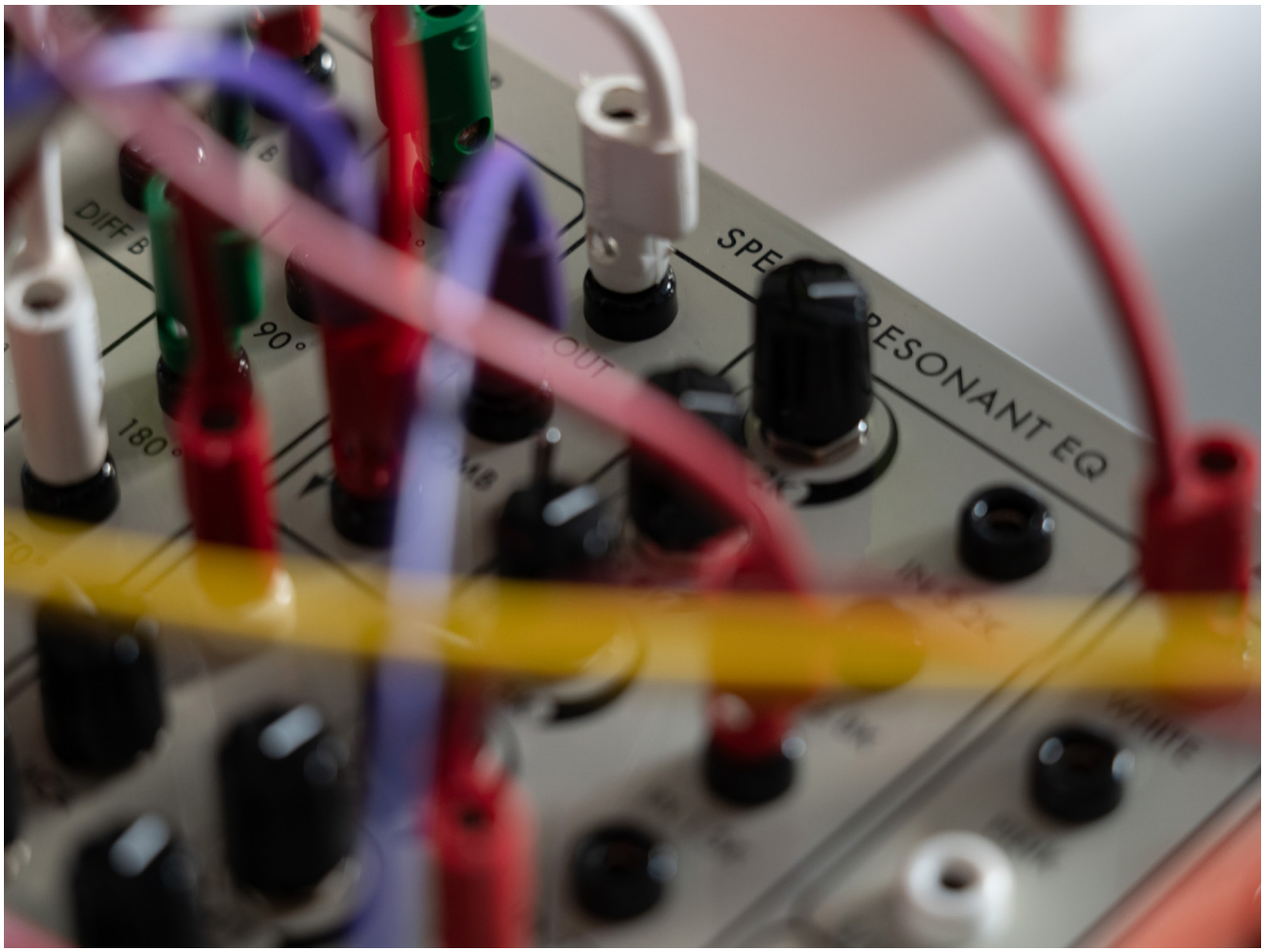
Q
BALANCED
MIX OUT L
MIX OUT R
RETURN
MIX
SEND
PAN
SERGE MODULAR
YANTRA


DIFF B
90°
180°
OUT

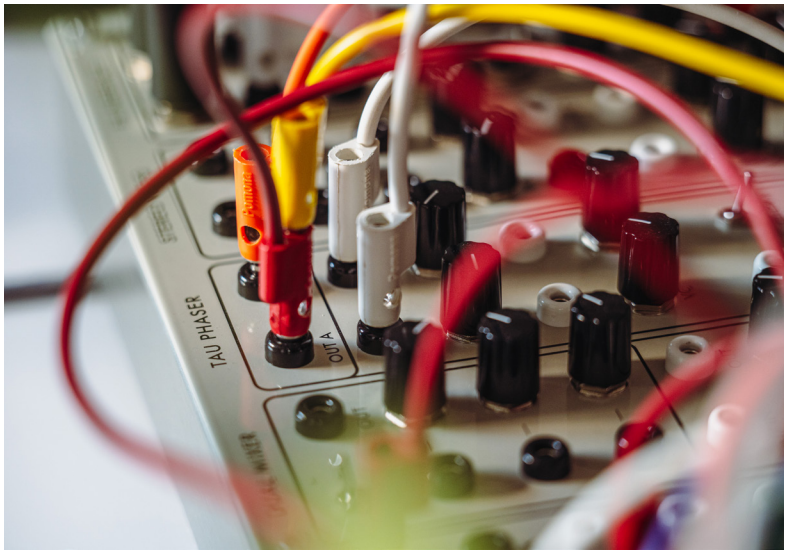
YANTRA is a comprehensive signal-processing panel designed to complement MANTRA II and TANTRA (or LA BESTIA III), while remaining a powerful standalone instrument. It combines the New Frequency Shifter, Special Resonant EQ, TAU Phaser, Stereo VCFQ, Serge noise sources, voltage-controlled crossfading, mixing, and a flexible FX Interface for external pedals and processors. With two sine-wave oscillators and extensive patching possibilities, YANTRA covers everything from spectral shaping, filtering, FM bliss and phasing to stereo processing, sound generation, and complex feedback patches.

- **New Frequency Shifter / Quadrature Oscillators:** two shifting channels for stereo or independent mono processing, from gentle beating to metallic textures. Two temperature-compensated sine oscillators also work as sound sources or exceptionally slow modulators, with four related phases available from each.
- **Special Resonant EQ / ACPR / Noise:** eight resonant bands, each with its own audio input, invite you to compose with different regions of the spectrum. Voltage-controlled band sums and feedback extend the EQ's response. The linear crossfader blends audio or CV; the noise source supplies material for filtering and percussion.
- **Dual Mixer / TAU Phaser:** Serge's updated and improved version of Jürgen Haible's Tau "Pipe" Phaser brings an 18-pole sweep and a spacious pseudo-stereo output pair. The two mixers combine audio and control signals, blend processed sounds or set the amount of an external feedback return.
- **Stereo VCFQ / FX Interface:** two Variable Q Filters share frequency and resonance controls for coordinated stereo sweeps and percussive ringing. The effects interface brings external pedals into the patch or serves as a level-and-pan mixer. Independent balanced outputs connect the panel to your studio.

Connections between blocks are yours to choose: put the EQ before the phaser, shift a filtered sound, or use the mixers to bring parallel paths together. The order of processing becomes part of the composition.

Patching YANTRA

The FRS oscillators can supply both tones and slow movement. Noise offers a broad palette for the EQ and filters; an external pulse source can excite the Stereo VCFQ. Add envelopes, sequencing or other sound sources from your wider system as the patch develops.



YANTRA

INTRO TO SERGE MODULAR 5

Overview 5

Serge Controls and Knob Types 6

(Almost) Everything Goes 7

Connecting and listening 7

Working with feedback 7

NEW FREQUENCY SHIFTER (FRS) 8

Frequency shifters 9

Quadrature oscillators 10

SPECIAL RESONANT EQ / ACPR 11

Special Resonant EQ 12

ACPR 13

DUAL MIXER / TAU PHASER 14

Dual Mixer 15

TAU Phaser 16

STEREO VCFQ / FX INTERFACE 17

Stereo VCFQ 18

FX Interface 19

Balanced outputs 19

PATCH IDEAS 20

INTRO TO SERGE MODULAR

Overview

The Serge Modular synthesizer, pioneered by Serge Tcherepnin in the early 1970s at CalArts, epitomizes the innovative West Coast approach to sound synthesis. Unlike traditional East Coast synthesizers that emphasized pre-set configurations and keyboard-based interfaces, the Serge system encouraged experimental and exploratory sound creation through a highly patchable and modular format. This open-ended design allowed users to manipulate both audio and control voltages in intricate ways, fostering unique textures and timbres. Its development coincided with the rise of avant-garde electronic music, making it a favorite among artists and composers keen on exploring new sonic territories.

Traditionally there has been no documentation - the user was forced to explore the Serge system. This lack of guidance may have had various reasons, however it had the benefit of forcing the user of the instrument to experiment and learn through “doing” - and leveraging an element of analog coincidences or plain chance. Some users, however, prefer to take a more analytical approach. So while we strongly encourage the “play like a child” approach, this manual tries to provide some basic information and background.

Color Scheme

One of the most distinctive features of the Serge Modular synthesizer’s color scheme is the use of color-coded jacks where each color represents a different type of parameter or signal. It is worth noting that the Serge system generally does not differentiate between types of signals such as audio or control voltage (CV) or logic - each signal can be (ab-)used for (almost) any purpose, e.g. logic signals used as audio or audio signals as CV.

- **White** (blue in earlier generations): white jacks denote DC coupled signals, usually unipolar 0V to appr. 5V. Often used for control voltage inputs (modulation signals, such as envelopes, LFOs) or outputs. Signal polarity and range depend on the module; DC-coupled paths can also carry audio.
- **Black**: represent bipolar signals (AC coupled, often ranging from -2.5V to +2.5V = 5Vpp, but may go to extreme amplitudes up to 24Vpp when using resonance or feedback). Commonly used for audio inputs and outputs. These are used for connecting audio signals, such as oscillators, filters, and other sound sources or processors.
- **Grey**: denotes that something is special, it can mean that the jack can be configured (via a jumper on the back of the module) to be AC or DC coupled. In the Sequencer 8 (SEQ8) the A-B output basically acts like the white (normal) outputs, but can go negative depending on the A and B voltages.
- **Red**: red jacks are associated with logic signals, i.e. sending or expecting DC coupled, 0V to 5V square shaped signals like pulses, gates or triggers. As an input, other signals may or may not work, depending on how hard the incoming flanks of such signals are. For a logic signal to be recognized, the level should be greater than 3V.
- **Yellow**: Yellow-colored jacks are often used for trigger inputs, i.e. to distinguish them from (red) gate inputs - the length of the pulse sent to a yellow input is irrelevant.
- **Purple**: also denotes that something is special, often used for SYNC inputs.

Serge Controls and Knob Types

In the Serge system, knobs are not marked with scales or range indicators. Instead, the function type is indicated graphically.

Function knob. Controls a parameter - in most cases that parameter can also be controlled by CV, so the knob acts like adding a DC offset.

VC input with attenuator. The knob controls to what extent (0% to 100%) the CV is applied.

Attenuverter (Processor). Goes from -100% through 0 to 100%. At the minimum position (CCW), the signal is inverted, from (roughly) center position to maximum (CW) the know works like an attenuator.

Crossfader. Blends from one signal to another. At center, each signal is equally present.

(Almost) Everything Goes

- Forget the distiction between CV and audio - any signal in the Serge world can be used as anything.
- Don't worry about patching "wrong". Even though each banana jack is (typically) either an input or an output, don't think too much about a patch and don't be afraid to plug a cord into the wrong jack - you may get unexpected or no results if you do connect jacks, but there's no harm in that.
- Use the FX Interface in MIX mode to set listening levels with its SEND controls. Patch MIX OUT L/R to the separate balanced-output inputs above, and set a suitable input level on the receiving equipment.

Connecting and listening

Use suitable cables and adapters. When connecting separately powered banana systems, establish their shared signal ground using the equipment's ground connection; banana signal cables do not carry it.

Listen through an output interface or attenuator that lets you set a suitable level for your mixer, interface or speakers. Start quietly. Establish a simple sound before adding modulation or feedback.

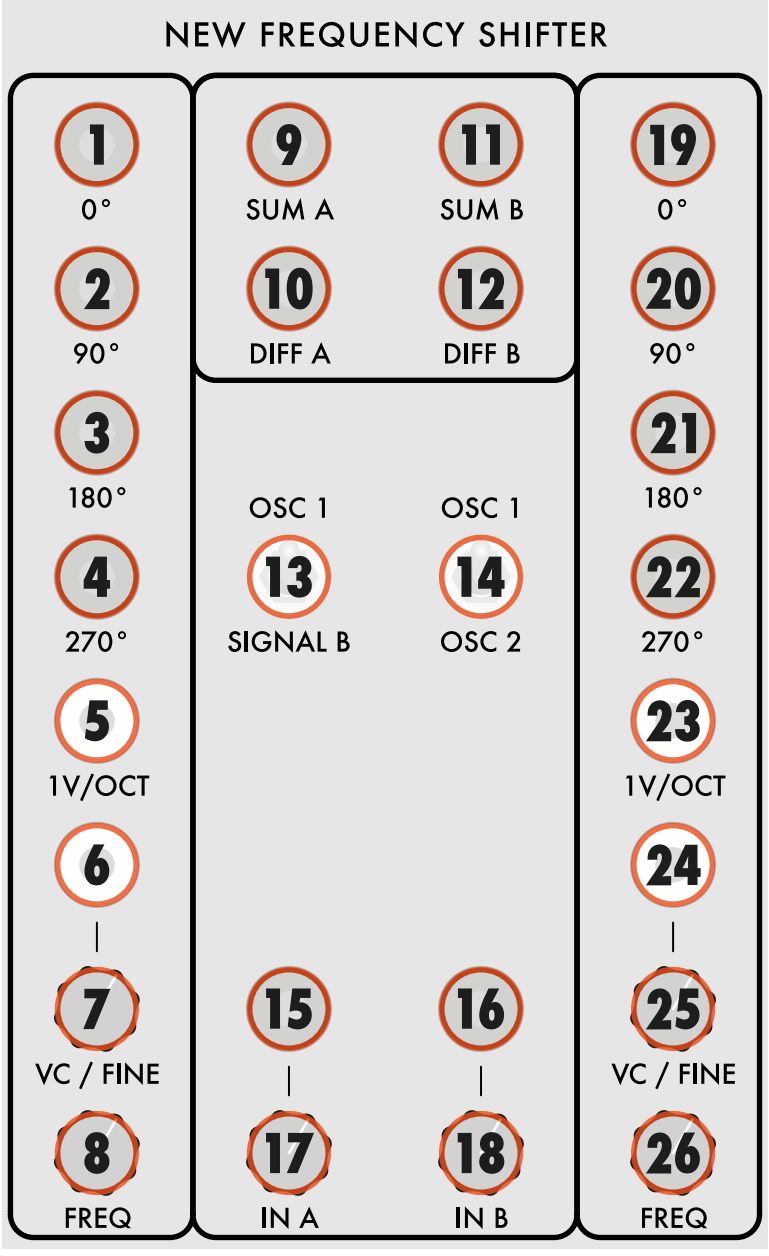
Working with feedback

Give the feedback return its own level control. Start with the return at zero and the listening level low, then increase it gradually. If the level rises sharply, reduce the return immediately. Bring it back to zero before changing the loop's cables.

NEW FREQUENCY SHIFTER (FRS)

The **New Frequency Shifter** is Serge's complete redesign of his original FRS, with improved quadrature oscillators and an improved DOME filter at its heart. It combines **two frequency shifters and two quadrature sine oscillators**. Process a stereo sound with a shared shift, give two mono sounds independent movement, or use the oscillators directly for tones and modulation.

Each temperature-compensated oscillator ranges from cycles lasting more than 30 minutes to approximately 24 kHz, with 1 V/octave tracking over 6+ octaves. Four phase-related sine outputs provide different starting points within the same cycle. Their level remains approximately 7 Vpp, even at ultra-slow rates; these are the black, AC-coupled outputs. The shifting channels offer upward and downward outputs simultaneously, opening up anything from gentle beating to metallic, inharmonic textures.



Frequency shifters

A frequency shifter adds or subtracts the same number of hertz from every component of a sound. Shift 100, 200 and 300 Hz up by 30 Hz and they become 130, 230 and 330 Hz: their original harmonic relationships change. Small shifts mixed with the original sound produce beating; larger shifts can transform the character of a voice, chord or loop.

Audio path

IN A, IN B Inputs (15) and (16), with level knobs (17) and (18). Each knob reduces its incoming signal before any processing.

SUM A, DIFF A Channel A's upward and downward outputs, (9) and (10).

SUM B, DIFF B Channel B's upward and downward outputs, (11) and (12). Use either direction, or blend them through separate mixer inputs.

The selected oscillator sets the amount of shift; the input knob sets the level. On the downward path, a frequency component that passes through zero turns upwards again. This is part of the distinctive sound of a DIFF sweep.

Shifting sources

Left selector (13) Chooses what shifts A: OSC 1, the left oscillator, or SIGNAL B, the signal patched to IN B.

Right selector (14) Chooses what shifts B: OSC 1, the left oscillator, or OSC 2, the right oscillator.

Stereo, dual mono and external shifting

Use	Left selector	Right selector	Routing and control
Stereo processing	OSC 1	OSC 1	Source left to IN A, right to IN B. Listen to SUM A/B or DIFF A/B as a stereo pair. The left oscillator shifts both sides together.
Dual mono	OSC 1	OSC 2	Two independent frequency shifters. A uses the left oscillator, B the right. Feed a different sound to each input and tune the shifts separately.
External shifting	SIGNAL B	OSC 1 or OSC 2	IN B becomes the shifting source for A. B still processes that same input through its own selected oscillator.

With SIGNAL B selected, A needs signals at both inputs and both input levels raised. IN B controls the level of B's own processing path and the signal used to shift A. The right selector changes B's processing only. For a clearly defined shift, begin with an external sine oscillator at IN B; richer waveforms add more complex colours.

To hear the effect, connect an audio source to IN A, select OSC 1 on the left and listen to SUM A through a suitable output interface at a low level. Raise IN A from zero, sweep the left FREQ, then use VC / FINE for smaller changes. Compare DIFF A. For beating, split the source to the FRS and one input of an external mixer; feed the shifted output to another mixer input and blend the two.

Quadrature oscillators

Each oscillator offers four sine waves at the same frequency, spaced a quarter-cycle apart: 0°, 90°, 180° and 270°. At slow rates, these produce related movements. The 0° and 180° outputs move in opposite directions; 90° and 270° form a second opposing pair. At audio rates they are four phases of the same tone.

Frequency and voltage control

FREQ (8, 26) Tunes the left or right oscillator, from very slow modulation to audio. Retuning also changes any shifting channel that uses that oscillator.

VC / FINE Knobs (7) and (25) fine-tune their oscillators when inputs (6) and (24) are unpatched. With CV connected, each knob becomes an attenuverter for modulation depth and direction. At zero, that CV has no effect.

1V/OCT (5, 23) Pitch-CV inputs for a keyboard or sequencer. A one-volt increase raises the corresponding oscillator by one octave.

Sine outputs Left 0°, 90°, 180°, 270°: (1-4). Right: (19-22). These direct outputs remain available in every shifter configuration.

Tones and related movements

Listen to either oscillator directly and tune it with FREQ and the unpatched VC / FINE. To combine both, use separate inputs of a mixer. Tune them close together for beating, or set an interval and send the same pitch CV to both 1V/OCT inputs.

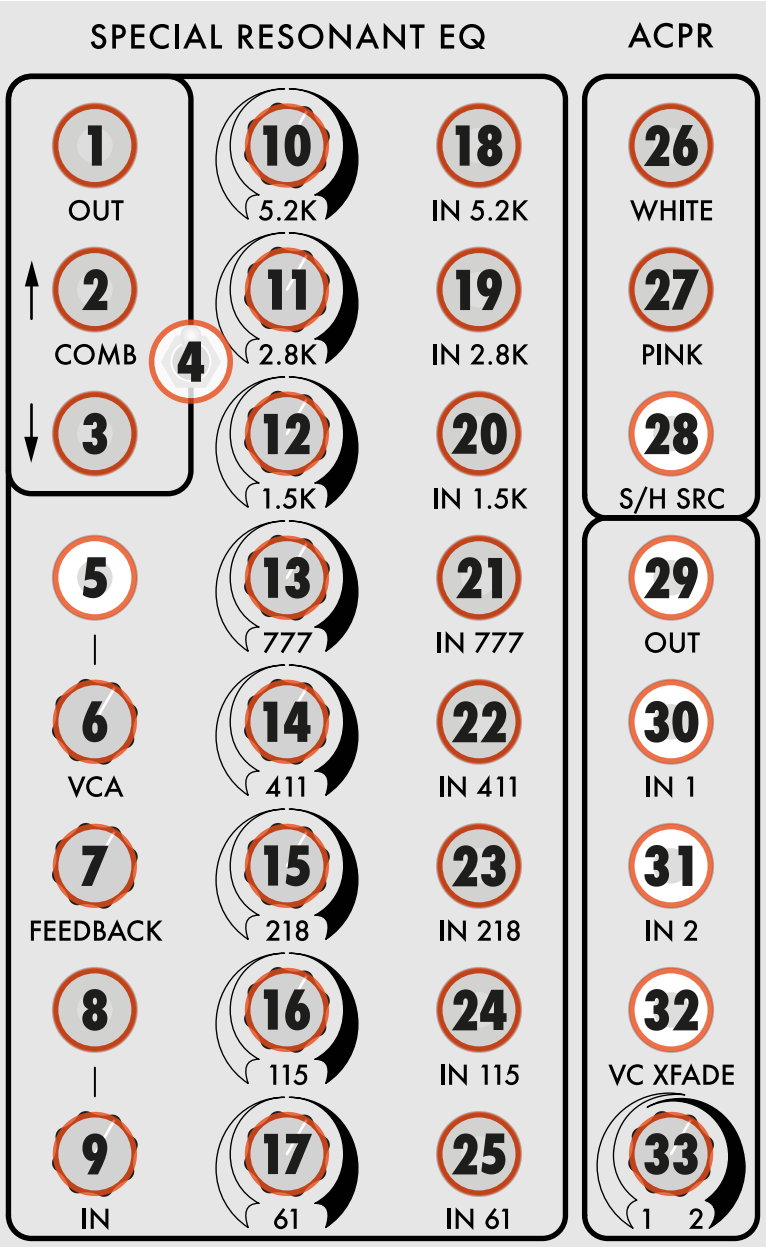
For slow modulation, send two phase outputs to different CV destinations with depth controls. Start with both depths at zero, then introduce a little movement. Try 0° and 90° for gestures that follow one another, or 0° and 180° for opposing movements. Very slow cycles still have the full output level, so start with small modulation amounts.

For richer tones, patch left 0° to right VC / FINE and right 90° to left VC / FINE. Begin with both modulation amounts at zero and both oscillators in the audio range. Listen to right 0°, introduce modulation from the left, then gently add the return modulation. The two frequencies and modulation depths shape the result; reducing both depths to zero restores the sine tones.

SPECIAL RESONANT EQ / ACPR

The **Special Resonant EQ** brings the character of Serge's classic Resonant Equalizer to an eight-band design, with a direct audio input for every band. Shape the resonances of one sound, or feed different sounds into different regions of the spectrum. The band controls can carve out hollows or build pronounced peaks, giving voices, noise and sustained tones a strongly coloured, almost acoustic character.

The sums of alternating bands each pass through a **VCA**, with feedback and switchable limiting adding another way to shape the response. Alongside the EQ, the **ACPR** provides linear crossfading for audio or CV, and the noise source supplies WHITE, PINK and S/H SRC outputs.



Special Resonant EQ

Inputs and bands

IN The common audio input (8), with its level knob (9), feeds the filter bank.

Band knobs (10-17) From top to bottom: 5.2K, 2.8K, 1.5K, 777, 411, 218, 115 and 61. Begin near the centre positions. Turning a band down reduces that part of the sound; turning it up emphasises it, becoming resonant towards the upper end of the control's travel.

Band inputs (18-25) Direct audio inputs for the corresponding bands, in the same order. Use these to give different sources their own place in the spectrum. For example, send a low tone to IN 115 and a brighter sound to IN 1.5K, then shape each with its band knob.

Outputs, level and feedback

OUT (1) The combined EQ signal.

COMB (2, 3) The sums of alternating bands: one collects the even bands, the other the odd bands. They offer two different spectral views of the same input. Listen to them separately, or use them as a stereo pair. The bands overlap, so changing a band can affect both outputs.

VCA Knob (6) and control input (5) govern the level through the VCAs in the two band sums. Open the VCA to hear the EQ; when it is closed, no signal comes out. An external envelope at the control input can give a sustained sound a changing level.

FEEDBACK (7) Sets the internal feedback. Start at zero and increase it gradually at a low listening level. Its effect depends on the band settings and VCA level. Return it to zero to remove the feedback.

COMB selector (4) Changes the limiting of the band sums, constraining their peaks and the feedback. The audible effect depends on the VCA and FEEDBACK settings. Compare its positions as you explore the response; at some settings the difference will be subtle or inaudible.

For a first listen, patch PINK (27) to the common IN and monitor OUT through a suitable output interface. Set FEEDBACK to zero, keep the input level low and open the VCA. Move one band at a time, then combine a few peaks and hollows. Compare OUT with the two COMB outputs before introducing a little feedback. Noise makes the changing shape of the filter bank easy to hear.

ACPR

The Active Processor is a **linear crossfader**: it moves smoothly between two audio signals or two control voltages. Blend oscillator waveforms, move between two envelopes, or change which modulation source shapes a sound.

IN 1, IN 2 (30, 31) The two signals to crossfade.

1 / 2 knob (33) Sets the manual balance between the inputs. Towards 1, more of IN 1 is heard; towards 2, more of IN 2. Between the ends, both contribute.

VC XFADE (32) Controls the crossfade with an external voltage. Use an LFO for recurring changes, or an envelope for a blend that develops with each note. Set the modulation depth at the source or with an external attenuator.

OUT (29) The resulting audio signal or control voltage.

Noise outputs

WHITE (26) Bright, broad-spectrum noise for percussion, breathy textures and filter excitation.

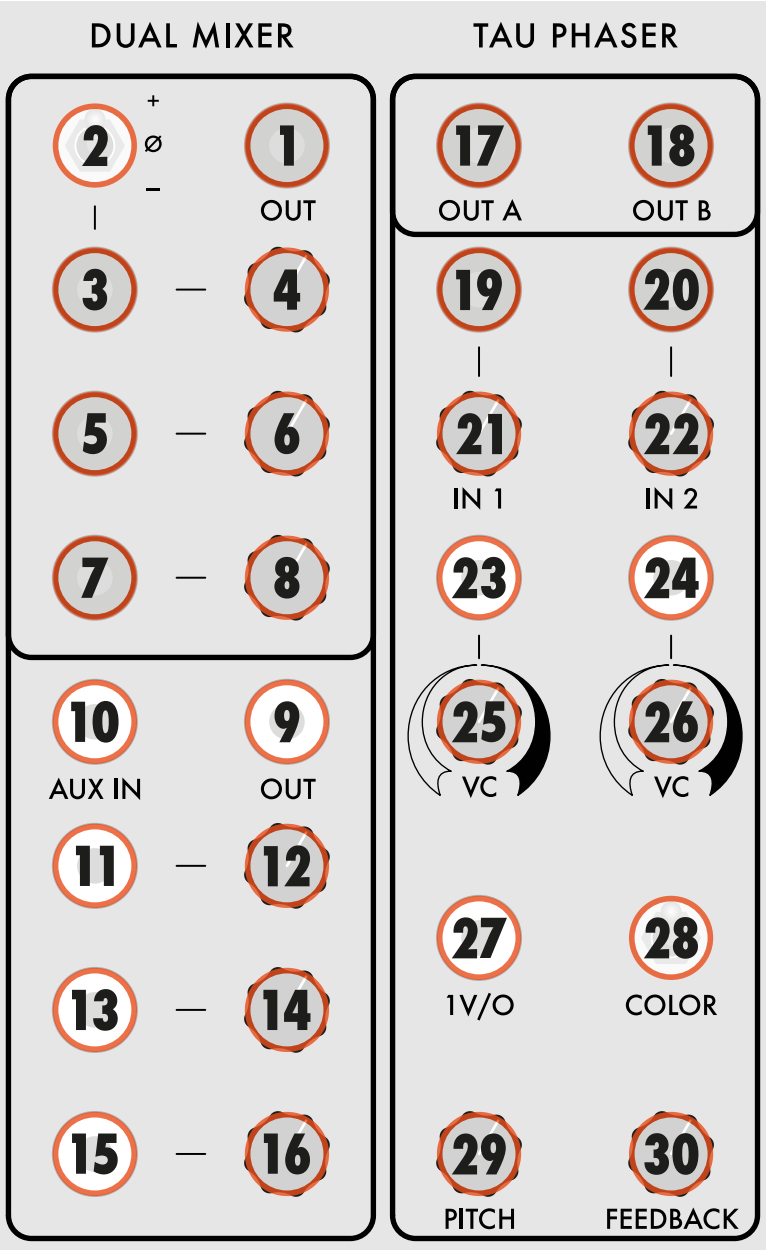
PINK (27) Noise with less high-frequency emphasis, useful for fuller, darker textures.

S/H SRC (28) A random source for the signal input of an external sample-and-hold. Supply that module with a separate clock to obtain a sequence of held random voltages.

DUAL MIXER / TAU PHASER

The **TAU is an updated and improved version of Jürgen Haible's Tau "Pipe" Phaser**, a unique analog design. Haible reworked the rare Tau "The Pipe" design, drawing on rare vintage ARP and Aries circuits. This version brings that distinctive sound to the Serge system: an 18-pole phaser with temperature compensation, two audio inputs, extensive voltage control and two outputs for a spacious pseudo-stereo effect.

Alongside it, the **Dual Mixer** provides two independent mixers for use throughout a patch. One is AC-coupled for audio and includes an invertible input; the other is DC-coupled for CV or audio. Both use low-noise, low-distortion Burr-Brown audio op-amps. They can feed the TAU, combine modulation sources or control an external feedback path elsewhere in the system.



Dual Mixer

Audio mixer

The upper mixer combines three audio signals. Its first input has a polarity switch, making it particularly useful for mixing related signals or controlling feedback.

Inputs (3, 5, 7) Level knobs (4), (6) and (8) set each input's contribution.

OUT (1) The combined audio signal.

Phase (2) Selects normal (+) or inverted (-) polarity for input (3). The other two inputs are unaffected. Inversion is most audible when the signal meets a related version of itself, as in a mix or a feedback loop.

For a feedback patch, use input (3) as the return and another input for the source. The return then has its own level control (4), while the switch lets you compare the two polarities. Start with the return at zero and a low listening level; return to zero before switching polarity or changing the loop's connections. Turning that control to zero stops the feedback.

CV and audio mixer

The lower mixer combines slow or steady control voltages as well as audio. Its three level controls are **attenuators**, not attenuverters: they reduce each signal without reversing its polarity. Use it to blend an envelope with an LFO, add a CV offset, or make a second audio mix.

Inputs (11, 13, 15) Level knobs (12), (14) and (16) set each input's contribution.

AUX IN (10) An additional input at unity gain, independent of the three knobs. Adjust its level at the source. A signal connected here remains in the mix when the other levels are down.

OUT (9) The combined CV or audio signal. To invert a modulation mix, use an attenuverter at its destination, such as either TAU VC control.

TAU Phaser

The TAU's long chain of phase-shifting stages creates a dense pattern of peaks and notches. Moving this pattern through a chord, noise or percussion brings out the hollow, sweeping character of the effect. A small movement can animate a sustained sound; a wider sweep makes the phaser much more prominent. The two outputs give different views of the same processed sound.

The Phaser has the most prominent effect on sounds with rich harmonic content (lots of overtones), but also responds beautifully to single clicks and pings (like single pulses) when resonance is high, generating organic, percussive sounds.

Audio path

IN 1, IN 2 Audio inputs (19) and (20), with level knobs (21) and (22). Both feed the same phaser. Use them to process two sources together, or feed a mix from the upper mixer into either input.

OUT A, OUT B Outputs (17) and (18). Use either for mono, or send them to separate left and right channels for pseudo-stereo. The input pair does not provide two independent stereo processing paths.

Sweep and modulation

PITCH (29) Moves the sweep by hand and sets the region around which modulation acts. It changes the phaser's tuning, not the pitch of an oscillator.

VC (23), (24) Each has an attenuverter, (25) or (26), to set modulation depth and direction. At zero, that CV has no effect; moving to the opposite side of zero reverses its action. The two inputs let you combine different movements, such as a slow LFO and a phrase-shaped envelope.

1V/O (27) An additional input for musical voltage control, separate from the two attenuverters. Use it to move the phaser's tuning with a pitch CV while keeping the VC inputs available for modulation.

COLOR (28) Reverses the polarity of the phaser signal before the output mix, changing the pattern of peaks and notches. Compare the two settings with a steady sound.

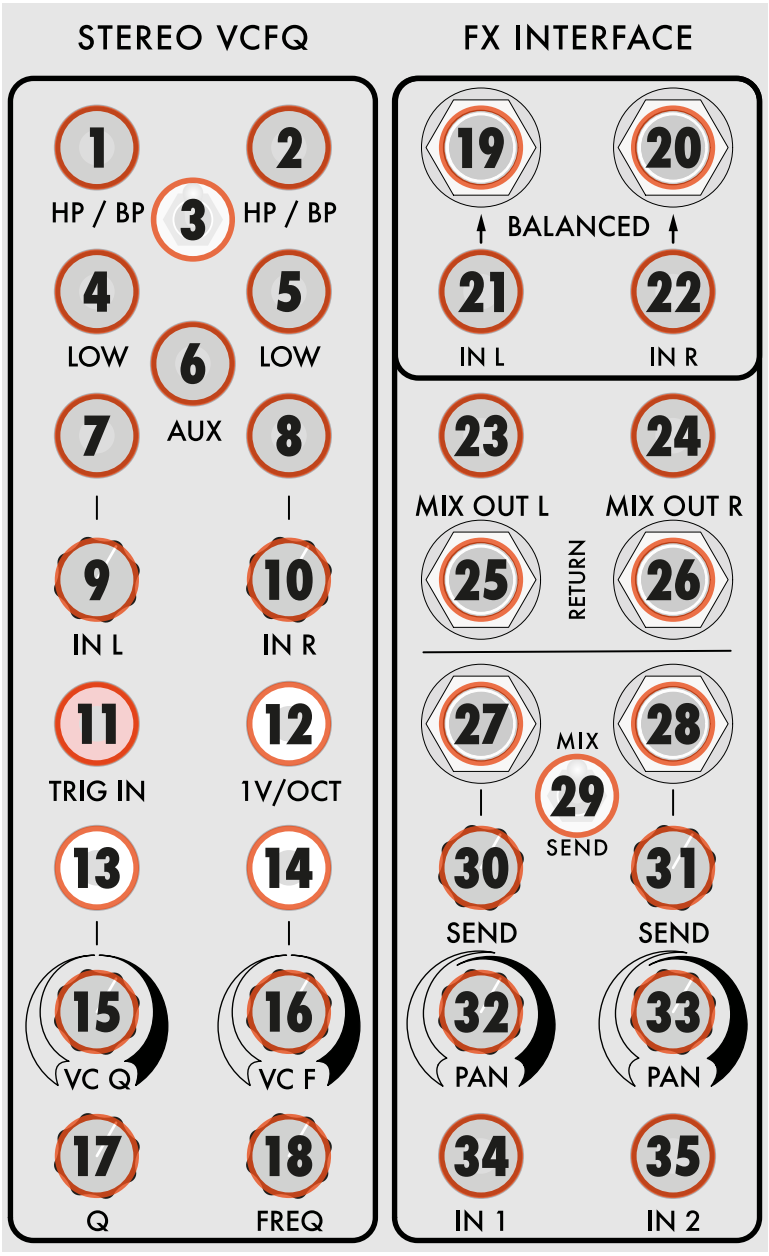
FEEDBACK (30) Sets the amount of internal feedback. Increasing it brings out the resonant peaks and gives the sweep a sharper edge. Start low and raise it gradually.

To hear the sweep clearly, send a harmonically rich sound to IN 1, leave IN 2 down and listen to OUT A at a low level. Begin with FEEDBACK at minimum. Move PITCH slowly, then add an LFO at VC (23), starting with attenuverter (25) at zero. A little modulation often preserves more of the source's articulation. Compare OUT B, or listen to both outputs panned apart.

STEREO VCFQ / FX INTERFACE

The **Stereo VCFQ** pairs two of Serge's classic Variable Q Filters under a shared set of frequency and resonance controls. Sweep a stereo sound as one, draw out resonant details, or excite both filters with pulses for pitched, percussive sounds. Low-pass outputs remain available while a switch selects high-pass or band-pass for the second output pair.

The **FX Interface** brings external pedals and effects into a patch. Its MIX mode also makes it a compact mixer with manual level and pan controls. A **separate pair of balanced outputs** connects the modular to a mixing desk or audio interface; patch the desired signals into this output module, including the FX Interface's MIX OUT when required.



Stereo VCFQ

Audio path

Audio inputs (7, 8) Separate left and right inputs, with IN L and IN R level knobs (9, 10). Use these to balance the incoming signals and adjust how strongly they drive the filters.

AUX (6) A common input feeding both filters. Its signal is unattenuated, so set the level at the source or with an external attenuator. This is a useful way to introduce a mono sound to both sides.

LOW (4, 5) Left and right low-pass outputs. Frequencies above the filter setting are reduced.

HP/BP (1, 2), selector (3) The selector chooses high-pass or band-pass for both outputs together. High-pass removes lower frequencies; band-pass brings out a region around the filter frequency. Compare these with LOW while using the same source and settings.

Frequency and resonance

FREQ (18) Tunes both filters together.

Q (17) Sets their resonance. Increasing it brings the filter frequency into sharper focus and makes triggered sounds ring for longer.

VC F Frequency-control input (14), with modulation amount set by knob (16). An envelope or LFO moves both filters together.

VC Q Resonance-control input (13), with modulation amount set by knob (15). Use it to make the emphasis change within a note or across a phrase.

1V/OCT (12) Common pitch-CV input. Useful for playing the filters' ringing tones from a keyboard or sequencer.

TRIG IN (11) A pulse excites both filters. Turn Q up to hear their decay; FREQ sets the pitch. No continuous audio source is needed for this use.

For a stereo sweep, patch the source's left and right channels to inputs (7) and (8) and listen to the LOW pair. Begin with modest input levels and low Q, then sweep FREQ and add resonance. Patch an external envelope to VC F, start with its modulation amount at zero and raise it until the sweep follows the shape of the note.

For a percussive voice, send pulses from an external clock or trigger source to TRIG IN and listen to either LOW output. Bring Q up and vary FREQ: short clicks can open into hollow, ringing tones. Change the pulse rhythm and Q together to move between distinct hits and overlapping decays.

FX Interface

Inputs, level and pan

IN 1, IN 2 (34, 35) The two audio inputs.

SEND knobs (30, 31) Set the send levels. In MIX mode, they act as level controls for the two input signals.

PAN (32, 33) Place the two channels in the stereo mix. Spread two mono sounds across the outputs, or pan them together towards one side.

MIX / SEND selector (29) Choose SEND to use the external effects path. MIX bypasses the send/return path and lets you use the input signals with the SEND level and PAN controls alone.

External effects

SEND jacks (27, 28) Connections to the inputs of external pedals or effects. Begin with the SEND knobs down, then raise them to suit the receiving device.

RETURN (25, 26) Connections from the external effects' outputs.

MIX OUT L, MIX OUT R (23, 24) The stereo mix, available for further modular processing or for patching to the balanced output module above.

To bring in an effect, connect its input to SEND and its output to the corresponding RETURN. Select SEND, patch a sound to IN 1 or IN 2 and monitor MIX OUT at a low level. Raise that channel's SEND gradually, adjust the effect and place the sound with PAN. Set the selector to MIX to hear the direct signal through the level and pan controls.

Balanced outputs

IN L, IN R (21, 22) Inputs to the independent output module.

BALANCED (19, 20) The corresponding balanced left and right outputs for external equipment.

To send the FX Interface mix to a mixing desk or audio interface, patch MIX OUT L to IN L and MIX OUT R to IN R, then connect the BALANCED outputs to the receiving equipment. These patch cables are needed: the balanced output module has no internal connection from MIX OUT. You can instead feed it from another pair of modular outputs.

PATCH IDEAS

A few starting points for playing across the panel. Get each patch sounding with the main controls first, then bring in the modulation or feedback.

For listening, set the FX Interface to **MIX**. Feed a mono output to **IN 1** with PAN centred, or a stereo pair to **IN 1 / IN 2** panned left and right. Start with SEND levels down. Patch **MIX OUT L / R** to the separate **IN L / R** above, and connect BALANCED to your monitoring system. Raise listening levels gently. No extra modules are needed unless mentioned.

Wandering colours

Turn noise into a slowly changing, almost vocal texture. The EQ supplies two different colours; the ACPR moves between them.

- Patch **PINK -> EQ IN**, then the two **COMB** outputs to **ACPR IN 1 / IN 2**. Listen to **ACPR OUT** in mono. Set EQ FEEDBACK to zero, open the VCA and bring IN up from a low level. Start the band knobs near their centres, then emphasise two or three bands.
- Move the ACPR **1 / 2** knob by hand to hear the contrast. For a repeating change, patch the **left FRS 0°** output to the lower DC mixer's first input **(11)**, then its **OUT (9) -> VC XFADE**. Begin with mixer level **(12)** at zero and the other mixer inputs unpatched.

Set the left oscillator to a cycle lasting several seconds. Bring up the mixer level until the colours trade places; the ACPR knob sets where the movement sits. Try a different group of EQ bands for a new vowel-like shape.

Bells pulled apart

A filter ping becomes two related notes that drift away from each other. **You need a clock or trigger source**; a pitch sequencer is optional.

- Patch the clock to **VCFQ TRIG IN** and **left LOW -> FRS IN A**. Leave the filter's audio inputs unpatched. Select **OSC 1** on the FRS left selector and listen to **SUM A / DIFF A** as a stereo pair.
- Bring Q up until the filter rings after each pulse, and choose a pitch with FREQ. Raise FRS IN A gently. Begin with the left FRS oscillator very slow, then increase its FREQ: the two outputs pull the ringing tone in opposite directions.

Short decays keep the rhythm crisp; longer decays let successive hits overlap. An optional pitch sequence at **VCFQ 1V/OCT** plays the ringing tone while the FRS keeps adding and subtracting its own shift.

Stereo phasing in slow motion

Let a phaser sweep and a filter sweep follow one another, while the TAU spreads the sound across the stereo field.

- Patch **PINK -> TAU IN 1**, **OUT A / OUT B -> VCFQ left / right audio inputs**, and listen to the **LOW** pair. Start TAU FEEDBACK and filter Q low. Raise the input levels gently and open VCFQ FREQ enough to hear the phaser. Find an interesting region with TAU PITCH.
- Patch **left FRS 0° -> TAU left VC (23)** and **left FRS 90° -> VCFQ VC F**. Begin with both modulation amounts at zero and set the oscillator to a slow cycle.

Introduce the TAU movement first, then a little filter movement. The two sweeps follow the same cycle a quarter-turn apart. Try 180° instead of 90° for an opposing movement, or substitute a chord or drum loop for the noise. A little TAU FEEDBACK gives the sweep a sharper edge.

A cloud of shifted feedback

Each trip around this loop shifts the sound again, building a cloud of moving tones. **You need an external sound source**; a sparse drum loop leaves room to hear the feedback develop.

- Use the upper audio mixer. Patch the source to its second input **(5)**, **mixer OUT (1) -> FRS IN A**, and select **OSC 1** on the left selector. Split **SUM A** to the listening input and the mixer's first input **(3)**. Knob **(4)** is now the feedback amount.
- Start knob **(4)** at zero, its phase switch at **+**, and the unused mixer input down. With the left FRS oscillator slow, raise the source's mixer level and FRS IN A until the direct processed sound is clear. Keep monitoring quiet.

Bring knob (4) up gradually. A small shift can grow into a restless shimmer; increasing the shift changes the spacing of the accumulating tones. **Turn (4) back to zero to stop the feedback**, and before switching polarity or changing cables. Reduce it immediately if the level takes off.

Let the EQ shape the return: with (4) at zero, replace the direct return with **SUM A -> EQ IN**, then **EQ OUT -> mixer input (3)**. Keep the listening connection at SUM A. Set EQ FEEDBACK to zero, open its VCA, keep its IN low and start the bands near centre. Bring (4) up again, then shape the bands: their colour is reinforced each time the sound returns.