Completely superflous: Praising the (vintage) polyphonic Yamaha CS series to the skies. The *legendary* CS sound has long since been written in gold in the logbooks of electronic music. That CS-80 is an icon of luxury vintage analog synthesis, and its little brothers have also attained special musical status and high market value. The price of a CS-60 (maybe even that of a CS-50) these days is what you paid for a CS-80 just a few years ago …



Yamaha CS-60 polyphonic synthesizer / SY-2 monophonic synthesizer

GREATSYNTHESIZERS.com

Let’s leave aside, for the time being, the issue of over-pricing on the vintage market, and have a comprehensive look at the special Yamaha CS *sound*. The combination of two resonant Yamaha filters (LowPass / HighPass) with their dynamic aftertouch control not only defines CS-50 / CS-60 / CS-80 as unique instruments among the poly-analog synthesizers, but inevitably brings Yamaha’s first mono synthesizers SY-1 and SY-2 into play.

SY-1 and SY-2, currently still receiving little attention, can be had relatively cheaply on the used market. The point is: With just some little knob tweaking (adjusting the presets), they deliver *exactly* the wonderful and distinctive CS filter sound. Monophonic only, but with all the expressive possibilities, the (occasionally) strange squeaking of the VCFs, the amazing dynamic range. In other words: The lively CS sound, albeit without ring modulator.

Typically Yamaha, typically illogical: From polyphonic to monophonic and back again

With the two solo synthesizers SY-1 / SY-2 we are already smack dab in the middle of the history of that Japanese company. A history that – typically Yamaha – is not entirely logical.

Year	Instrument	Speciality
1959	**Yamaha Electone D-1**	First Yamaha organ with all-transistor design
1962	**Yamaha Electone D-2**	First (?) official Yamaha „home“ organ
1967	**Yamaha Electone D-2B**	First of the Electone series to be shipped to the US
1968	**Yamaha Electone EX-21**	Prototype; Specially designed for stage performances
1970	**Yamaha Electone EX-42**	Yamaha's first commercially available Electone stage model
1973	**Yamaha Electone GX-707**	Prototype; Conceived of as a ‚theatre model' for use on the concert stage
1975	**Yamaha Electone GX-1**	Treble-manual synthesizer with pedalboard and ribbon controller

See also https://www.imoose.nl/electone (informative Electone time line).

See also https://www.yamaha.com/en/about/history/products (brief overview of Yamaha's development of products).

See also https://europe.yamaha.com/en/products/contents/music_production/synth_40th/history/chapter01/index.html (Origins of the Yamaha Synthesizer).

Electone

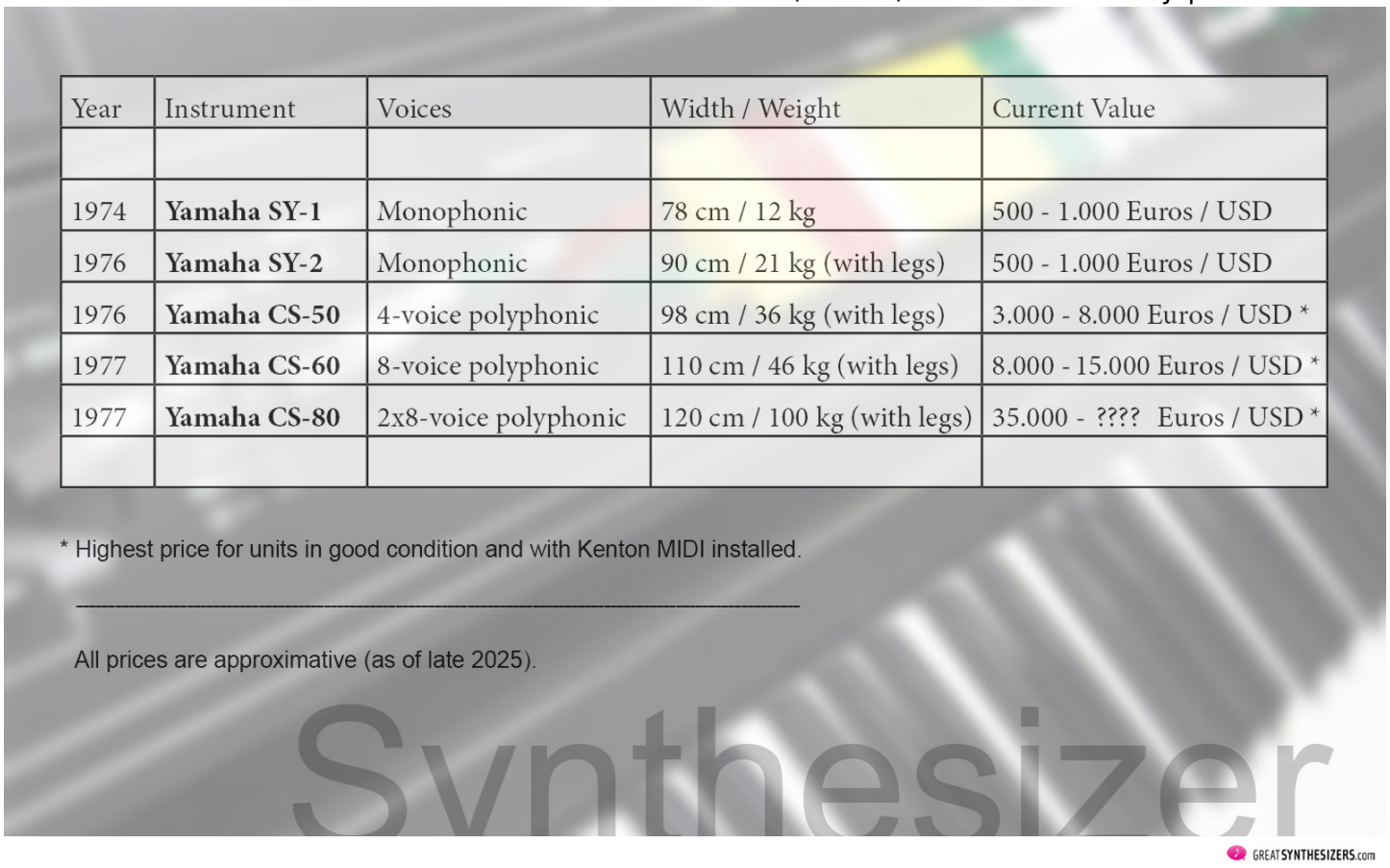
GREATSYNTHESIZERS.com

Introduced in December 1959 (!), Yamaha presented the first organ whith exclusively transistor generated sound. That Electone D-1 was the beginning of a long line of electronic keyboard instruments for which Yamaha created the brand name “Electone”.

And this brings us to 1970. Yamaha’s Electone EX-42 was a monstrous organ with “5 manuals” (3 rows of keys, 1 pedal-row, 1 ribbon controller with its own sounds) and an associated rotary speaker system. This organ and the Electone GX-707 (prototype) from 1973 were the immediate forerunners of the Yamaha GX-1 from1975. To this day, the GX-1, the two-part 8-voice instrument with a separate solo synthesizer, pedals and PA system (with tube technology), represents the largest polyphonic analog synthesizer ever built.

“In 1973, Yamaha completed development work on a prototype codenamed the GX-707. Based on cluster voltage control, this instrument could be regarded as the predecessor of the Electone GX-1. Although it looked just like an Electone, the GX-707 was actually an eight-note polyphonic synthesizer — more specifically, the upper and lower keyboards supported eight-note polyphony, while the solo and pedal keyboards were both monophonic.”

(https://de.yamaha.com)



Year	Instrument	Voices	Width / Weight	Current Value
1974	**Yamaha SY-1**	Monophonic	78 cm / 12 kg	500 - 1.000 Euros / USD
1976	**Yamaha SY-2**	Monophonic	90 cm / 21 kg (with legs)	500 - 1.000 Euros / USD
1976	**Yamaha CS-50**	4-voice polyphonic	98 cm / 36 kg (with legs)	3.000 - 8.000 Euros / USD *
1977	**Yamaha CS-60**	8-voice polyphonic	110 cm / 46 kg (with legs)	8.000 - 15.000 Euros / USD *
1977	**Yamaha CS-80**	2x8-voice polyphonic	120 cm / 100 kg (with legs)	35.000 - ???? Euros / USD *

Following its excursion into the world of polyphonic synthesizers (none of which were on the market in the early 1970s), Yamaha set its sights on a first solo synthesizer, the SY-1, in 1974.

The SY-1 – most likely that “solo keyboard” from the GX-707 / GX-1 (thanks to Paul V. for the hint) – already bore distinctive elements of the later CS series: The typical, slightly nasal quality of Yamaha’s LowPass-HighPass filter combination (restricted to *one* frequency control from low to high, and including a common resonance slider), as well as a fixed aftertouch (Touch Control) to regulate the LFO modulation depth, the filter frequency and the volume. This Touch Control is often referred to as “Velocity” (even by Yamaha), although it is ultimately monophonic aftertouch.

YAMAHA SY-1



Photo (c) www.rlmusic.co.uk

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The SY-1 was followed in 1976 by another *Combo Synthesizer of the CS series*, the SY-2. This instrument came up with frequency- and resonance-faders for both the LowPass-VCF and the HighPass-VCF, as well as continous control of the aftertouch (Touch Control *Sensitivity*).

With its corresponding lid and removable legs, the SY-2 is astonishingly heavy (21 kg). In its black Tolex case (90 cm wide), it is clearly an early member of the Yamaha CS series.

YAMAHA SY-2



The CS-50, the first polyphonic instrument in the CS series, was also presented in 1976, wherby that 4-voice synthesizer impresses not only with its typical CS sound, but also with its manageable size (4-octave keyboard, total width: 98 cm) and with its “acceptable” weight of 36 kg. “Acceptable” from today’s perspective, of course.

“Never highly respected when it was in its prime, ignored by most players, and very much disliked even by many CS-80 lovers, this is still a desireable instrument. Buy one before prices start to become realistic. There’s just too much inside even a CS-50, let alone its bigger brothers, for it ever to be re-manufactured; and when you’ve heard what one can do on a good day, heard that power of that old unrepeatable technology, you might think that current prices are a bargain.”

(Peter Forrest, The A-Z of Analogue Synthesisers,
Part Two, rev. 2003, page 346)



Yamaha CS-50 with Kenton MIDI. Photo (c) www.rlmusic.co.uk

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The ergonomically designed CS-50 is particularly user-friendly. Its LFO – located as a sort of performance module to the left of the keyboard – offers significantly longer faders than those LFO sliders of the CS-60 / CS-80, allowing for more precise and subtle LFO programming. In addition, the unique ring modulator is within easy reach during playing – also true of the CS-60, but not of the CS-80 (due to its size).

Even more powerful is the 8-voice Yamaha CS-60 from 1977, with its increased number of voices and its 5-octave keyboard. Not to forget that one “generous” memory space and the musically enhancing ribbon controller.

YAMAHA CS-60



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YAMAHA CS-60



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YAMAHA CS-60



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The pictures give a sense of how enormous a Yamaha CS-60 is. 110 cm wide and 46 kg heavy, it demands a large and stable space in your studio.



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Pic.: Bottom of the Yamaha CS-60

The bottom reveils not only the power cable compartment (left) and the ventilation slots of the 8-voice instrument, but also the hidden headphone socket, imperceptible from the front.

Presented side by side with the CS-60 (NAMM Show June 1977), the CS-80 impressed with its overall luxury: 16 voice boards (2×8 voices), a weighted keyboard with velocity and polyphonic aftertouch, 4 memory locations, illuminated preset buttons, additional chorus … no description is necessary, the CS-80 is a legend of its own.

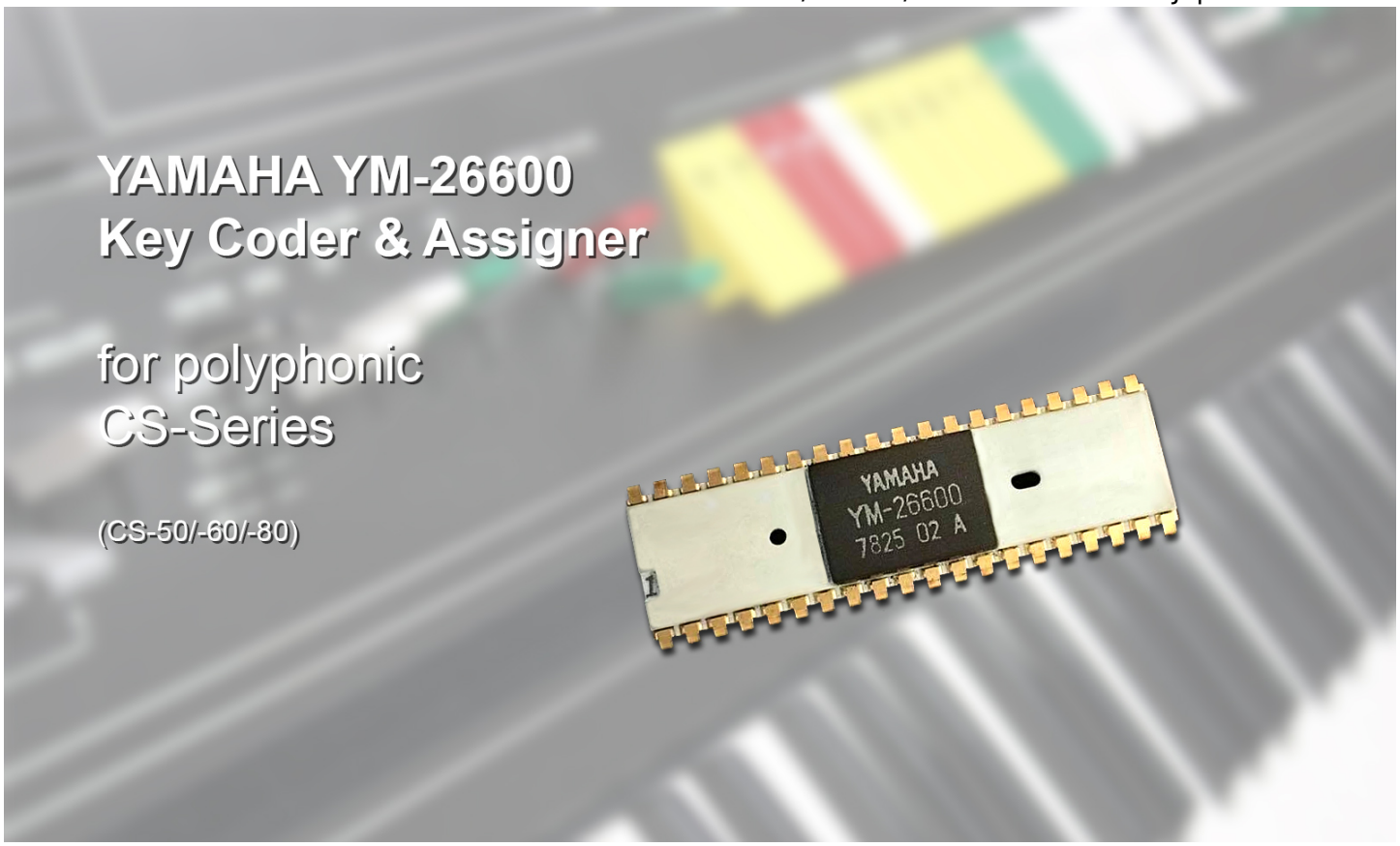


Yamaha CS-80 - king of the polyphonic CS-series. Photo (c) www.soundgas.com

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120 cm wide and nearly 100 kg heavy (including its legs), the CS-80 demands a very large and very stable space in your studio.

By the way: Interesting (if not surprising) that Yamaha advertised the – at that time new – integrated circuits of the CS series in 1977. This is what made the polyphonic CS series possible in its “compact design” (sic!). But ironically, it is precisely those components that are the Achilles heel of the Yamaha CS-50 / CS-60 / CS-80 today. If one of the so important chips stops working, the instrument is maybe beyond repair. There is – so far – no replacement for those aforementioned Yamaha custom chips.



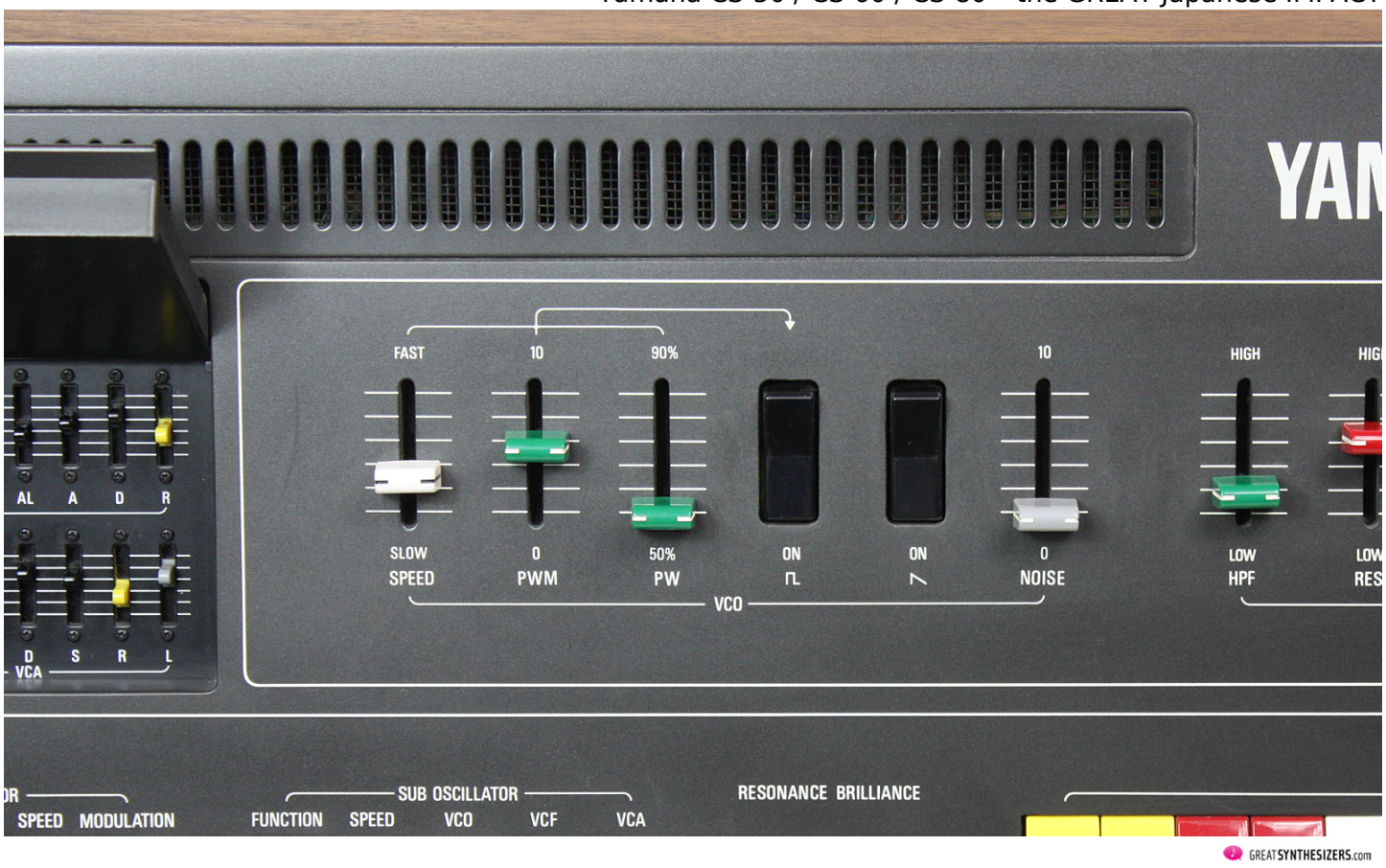
One of the rare Yamaha custom-ICs.

CS-Sound: The sum of the many

Anyone who has understood (heard!) the peculiarity of vintage CS sound architecture will understand why this sound is inseparably combined with the vintage hardware. In other words: Modern CS derivatives are sometimes useful, a good marketing gag and quite suitable for some musical purposes. But that's about it – they don't add up to the vintage CS sound.

Following the signal path of a CS-50 / CS-60 / CS-80, the peculiarities of the original sound architecture are as follows:

Pulse width modulation – excellent in sound, comes with its own independent LFO …



HighPass filter / LowPass filter combination, both filters with separately adjustable frequency and resonance ...

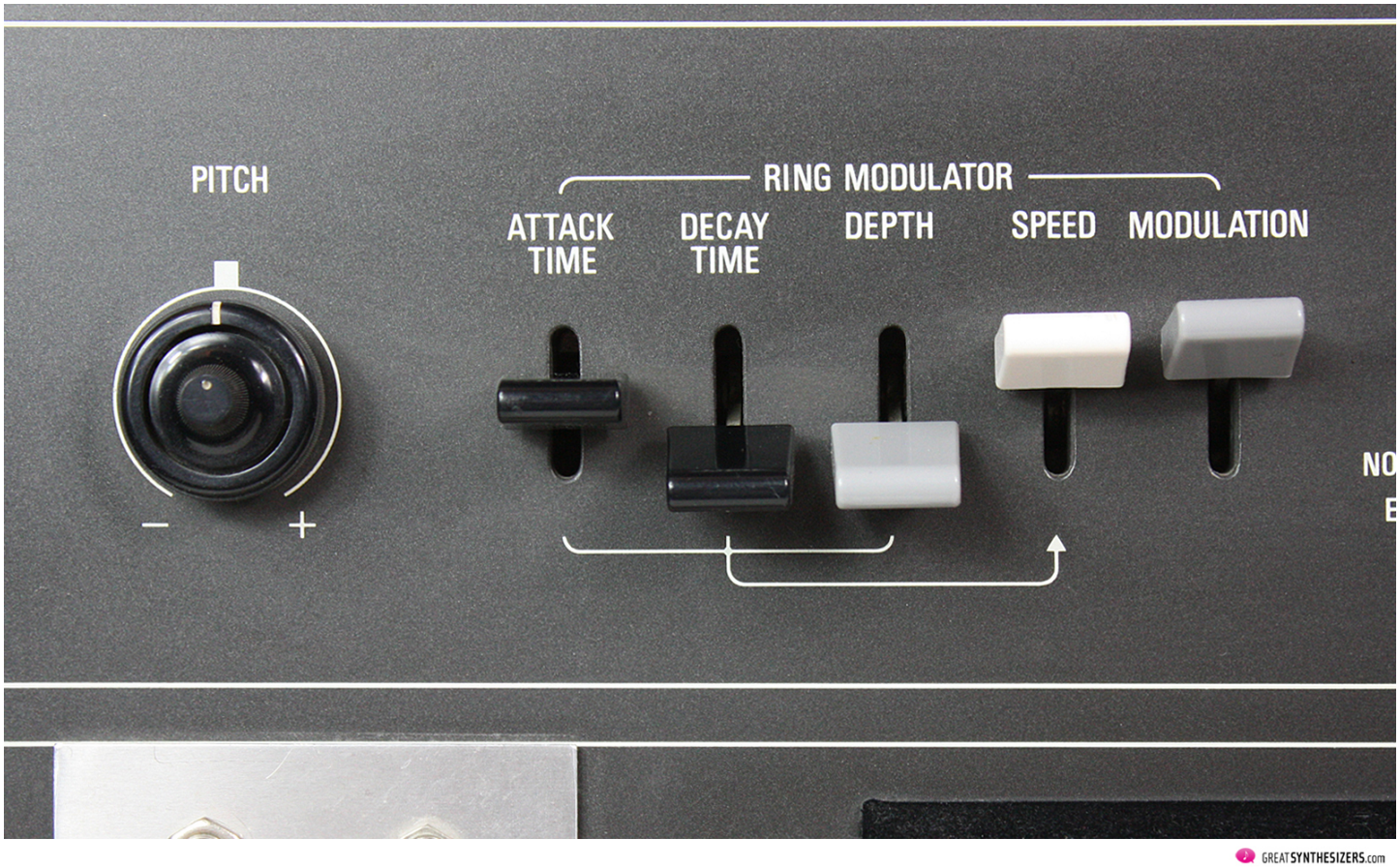


Plain sine wave that can be added (VCA) to the overall sound, for that certain “extra” in the bass, for

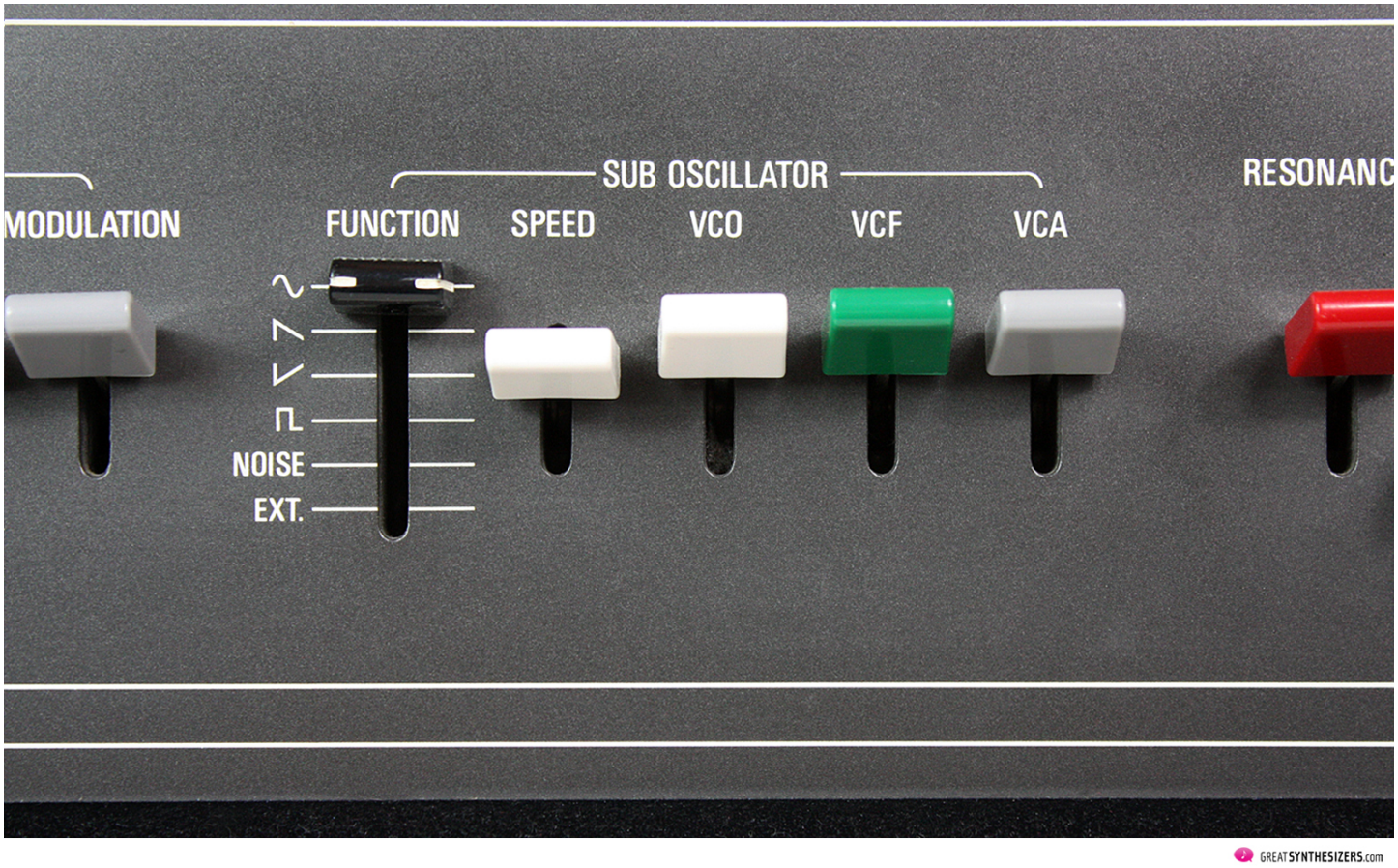
more sonority – a *must* with the CS-50 and CS-60 …



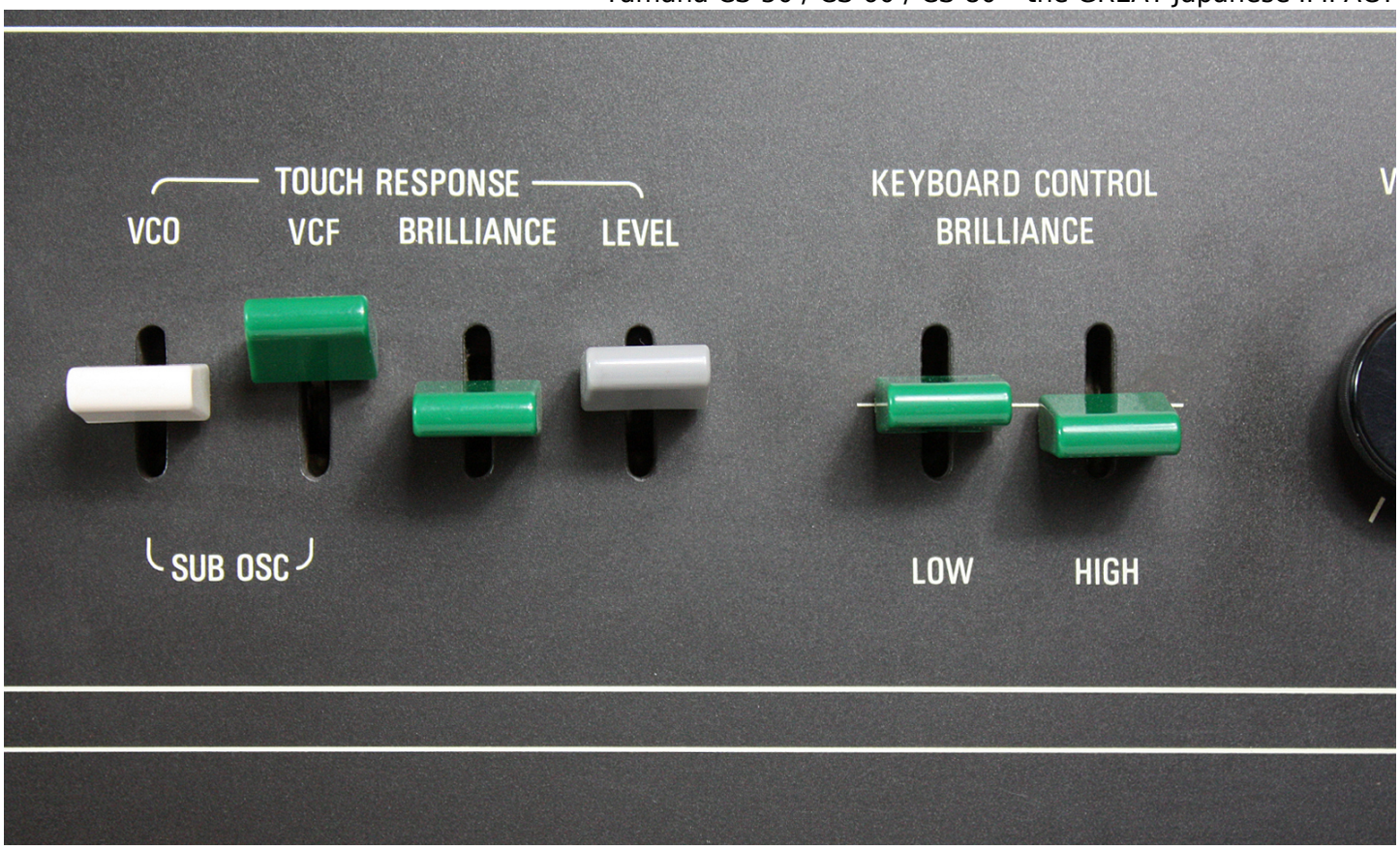
Continuously (!) variable ring modulator – unique to this day – with its own Modulation-Oscillator and separate, small envelope (to control the oscillator's frequency) …



Sub Oscillator – in fact an LFO – with various waveforms (e.g. ascending *and* descending sawtooth), noise modulation (white noise) and EXT IN (more on this later) ...



Aftertouch (CS-50/CS-60: monophonic, CS-80: polyphonic) with optional control of the LFO, filter frequency, the VCA, the LFO speed (CS-80 only) ...



Excellent keyboard (trademark of Yamaha), and – in addition – various performance functions such as ribbon controller, portamento and glissando ...



The sum of all these features is the CS sound today: Silvery pulse width modulation with nuanced vibrati –

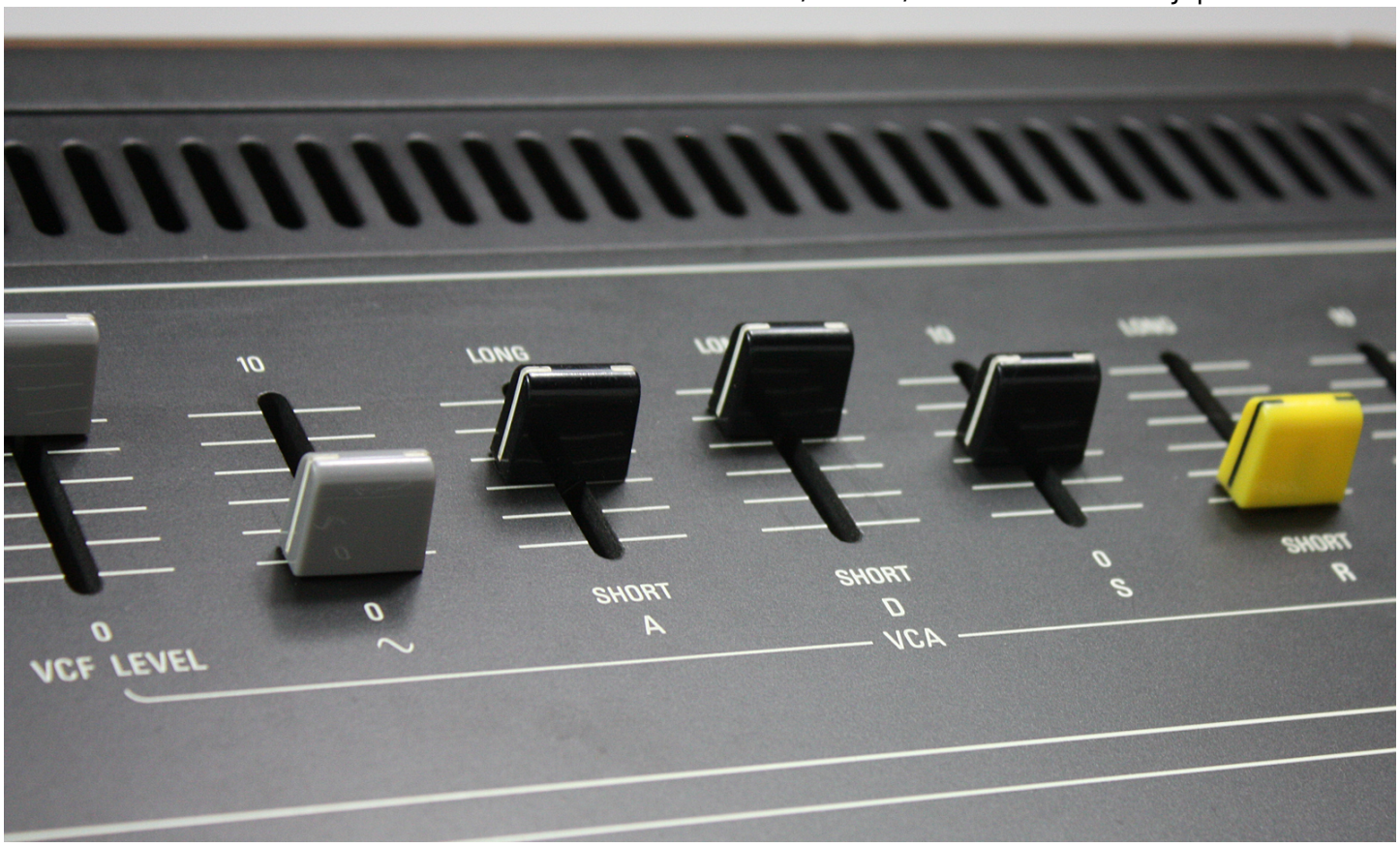
live while playing (via aftertouch); Dynamic filter modulation (again via touch response) with a hint of ring modulation; Massive sine bass with slow PWM to the limits of audabilty; Beguiling ribbon and keyboard play (dynamics!), enhanced with portamento effects.

Be it as it be: Each of the above-mentioned *performances* is inevitably linked to the original hardware. In total they result in everything that connoisseurs, owners, players and listeners alike would call the CS *sound*. (CS-50 / CS-60 / CS-80). The *character* of those instruments. All the special aspects that constitute the sound architecture and performance possibilities, making this polyphonic (vintage) CS series what it is: unique.



It is completely irrelevant that most of the on-board presets instantly conjure up a smile on your face. They are only partially usable. It is also completely irrelevant that the *one* memory location of the CS-60 and the *four* memory locations of the CS-80 are in the main obsolete. And it is irrelevant that there is no pitch bender in the classical sense, but rather a ribbon controller (which is a perfect substitution).

Not entirely insignificant, but from an artistic point of view possibly a real bonus: There is *no* auto-tuning of the voices. Few instruments – apart from an out-of-tune Prophet-5 or Memorymoog – sound as lively as a CS-50 / CS-60 / CS-80. We do not wish to deny that there is a very narrow line between the Musically still Bearable (but aesthetically interesting) and the Musically Unacceptable. It’s an adventure.



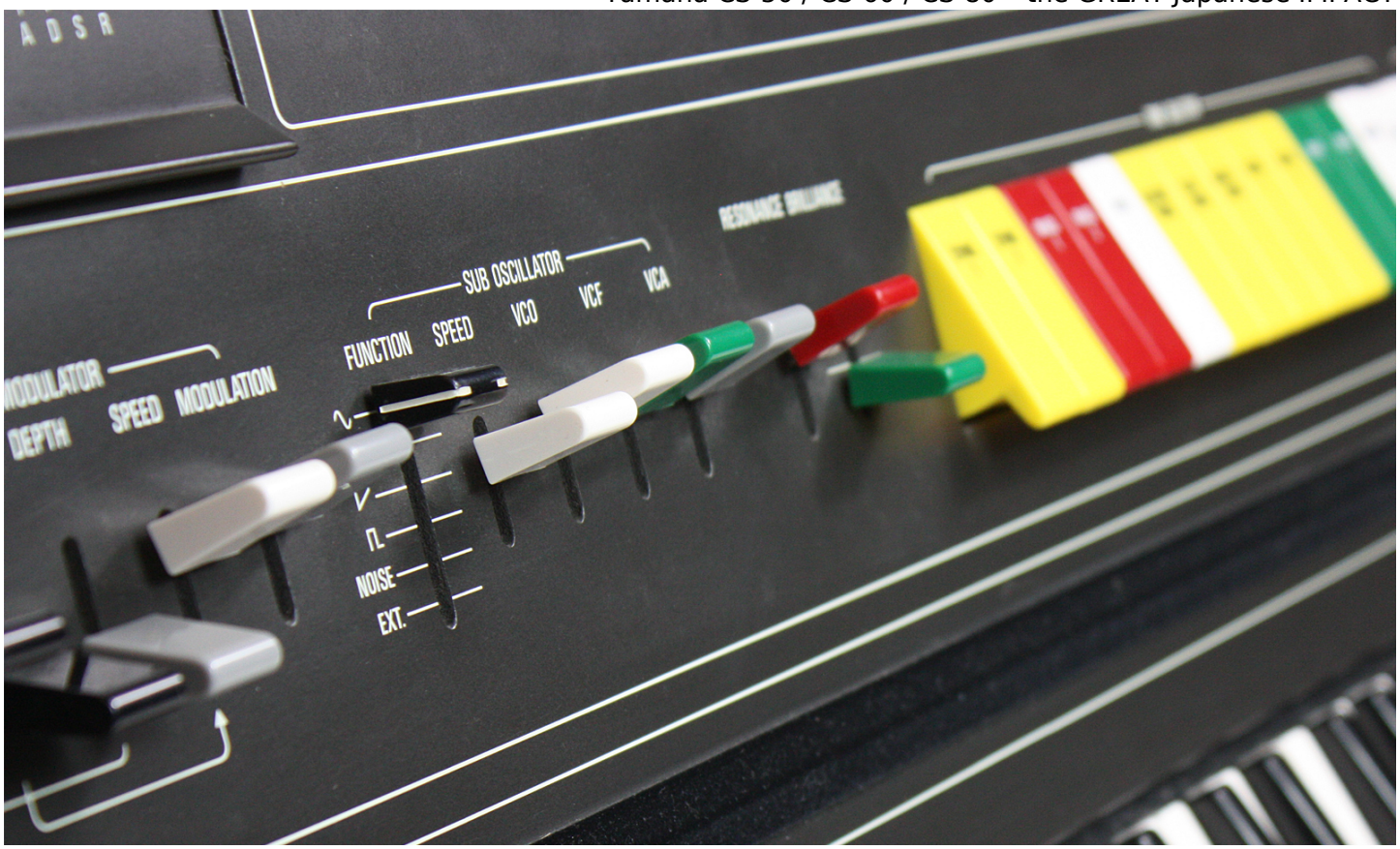
VCA signal-mixer: VCF level and unfiltered sine-wave.

GREATSYNTHESIZERS.com

Sound-Aspect “Hardware”

The GREAT Japanese IMPACT that took place within the hallowed halls of Hamamatsu from 1974 (SY-1) to 1976 (SY-2 / CS-50) and 1977 (CS-60 / CS-80), is a clear indication of the enormously high standards that Yamaha had set at that early stage.

Going by appearances, the claim would seem to be a farce. Pfff – those cheesy organs … high standard? Oh yes – indeed! There are hardly any synthesizers that could hold a candle to a CS-50 or a CS-60 in terms of hardware – luxurious construction and high technical reliability. Admittedly, the CS-80 is slightly less reliable due to its exceedingly complex internal wiring.



SUB OSCILLATOR (LFO) with various waveforms and modulation destinations.

GREATSYNTHESIZERS.com

The small (rocker) faders with plastic pots, for example, look unspectacular, even cheap (but they are excellent to use and convey a feeling of luxury, of tactile elegance), the ribbon controller is covered with velvet (!), the metallic dark-silver looking panel is made of finely processed wood (!), etc.

Be that as it may: The high-quality hardware is an integral part of the vintage CS series. It has a significant influence on the musical performances and on the sounds that are possible on these instruments.

EXT IN – that particular source of inspiration

There is very little information about the EXT input of the CS-50 / CS-60 / CS-80. No wonder, since few musicians would have a clue as to its function. And Yamaha’s explanations are no big help either …



“SUB OSCILLATOR – FUNCTION selects a waveform: sine, sawtooth, inverted sawtooth, square wave, whte noise, or an external input. A line level signal connected to the Ext In jack on the rear panel will modulate the Sub Oscillator in EXT mode.”

(CS-60 user manual, page 39)

The key to a better understanding of EXT IN lies in the word function (it does not say “Waveform”). And the function of the external signal brings us a little closer to the crux of the matter. According to the manual, the EXT IN supposedly modulates the LFO, but this is not the case! Way, way back in the user manual, the APPENDIX holds the secret ...



Global performance features: Sustain and Portamento / Glissando.

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“The synthesizer’s External input can afford some interesting effects. To obtain strange “vocal” effects, plug in a source of a pure, high-frequency sound, such as a 10kHz or higher frequency sine wave. Then engage the VCF (filter) on the Sub Oscillator and add a lot of Resonance.”

(CS-60 user manual, page 49)

Logical. Use an external VCO as a modulation source for filter modulation (filter FM), and – at high resonance settings – you get classy vocal sounds. Perfect. But it gets even better …

“You might try connecting a sequencer to the External input and engaging the Sub Oscillator’s VCO lever, thus creating a sequence of different notes when you hold down just one key.”

(CS-60 user manual, page 49)



Simpler: Controlling the CS-Oscillator(s) via an analog sequencer is possible. This pertains to monophonic movements only, but there you are! The principle of CV control also applies to the filters, which can be modulated in parallel to the oscillators via that analog sequencer – or by any other external CV source, such as LFO, envelope, whatever ...

To sum it up: Don’t underestimate EXT IN. It’s highly useful.

Sound-Aspect “Expression”

The EXT IN *function* and the volume pedal provided by Yamaha were a first indication of the expressive possibilities inherent in the CS-50 / CS-60 / CS-80. Keyboard dynamics and the ribbon controller completed the image. These possibilities (variablities of pitch, volume, dynamics and liveliness) have become a synonym for the CS character *par excellence.*

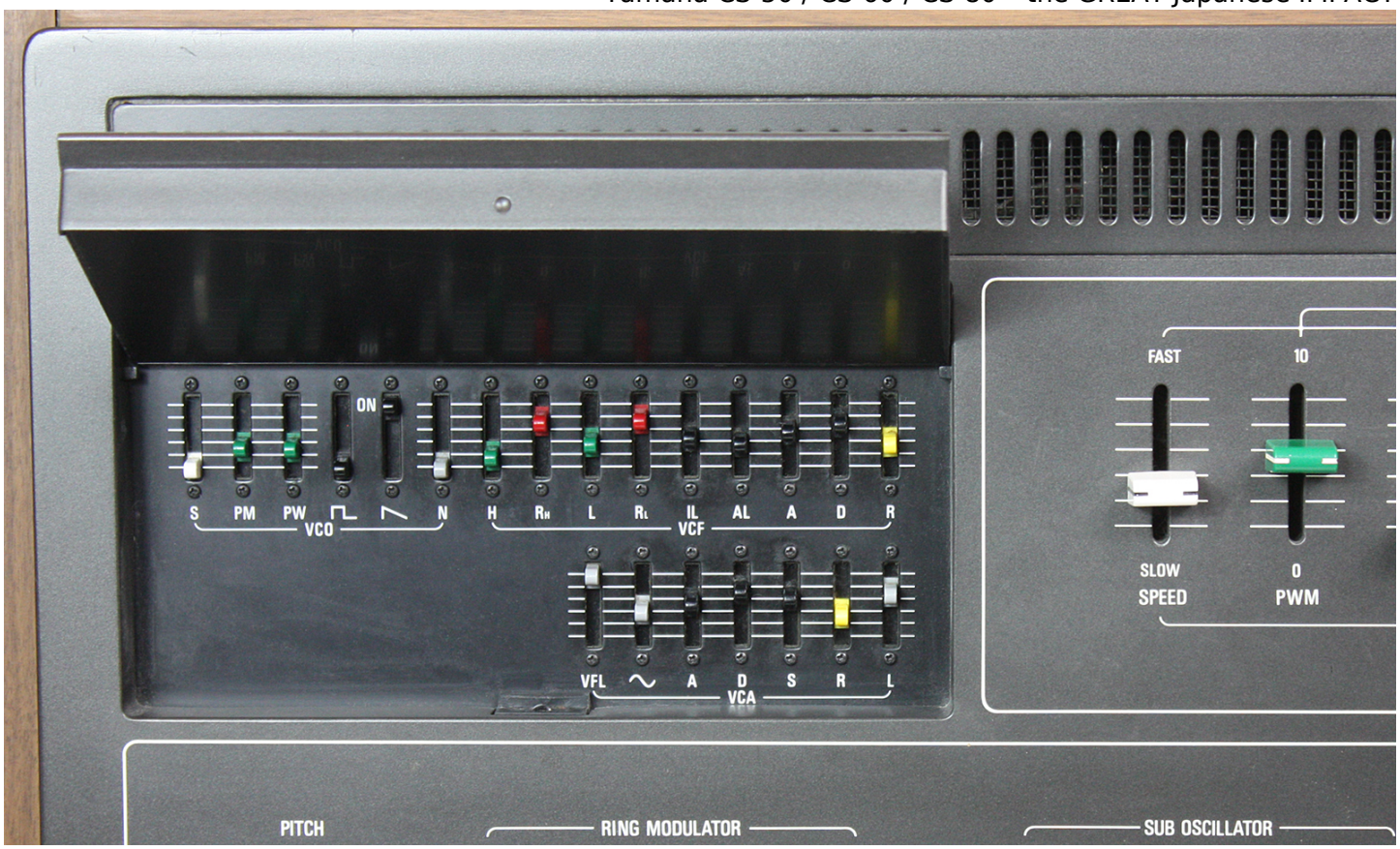


Or, to put it in Yamaha's words:

"Yamaha polyphonic synthesizers enable you to get a very wide range of keyboard dynamics, plus further dynamic control via the expression pedal. Thus the playing level can change quite dramatically depending on which voices you have programmed and how you play them."

(CS-60 user manual, page 48)

The above-mentioned simple quote from 1976/77 is all the more astonishing considering that the remarkable performance orientation and liveliness of that early SY / CS series (first introduced in 1968 with the Electone EX-21) has remained a laudable exception to this very day. Well, maybe a Moog Polymoog with Polypedal-board (from 1975) comes close. Anyhow, most polyphonic analog synthesizers since then have offered significantly fewer expressive possibilities – apart from such proverbial exeptions as the Sequential Prophet T8 (1983).



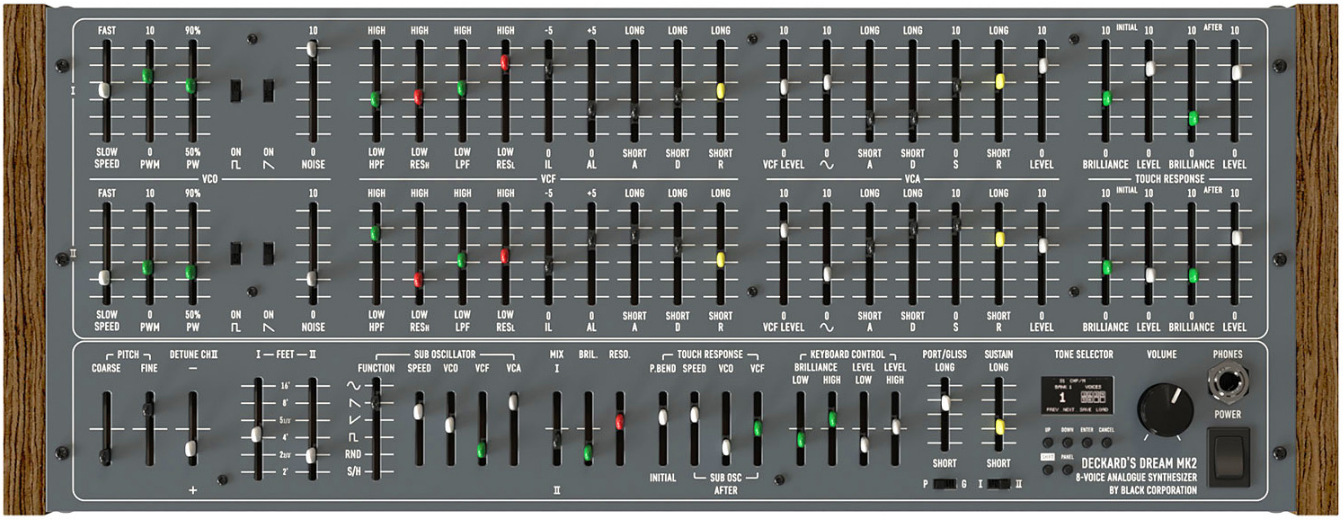
CS-60 memory panel (beneath the block diagram). GREATSYNTHESIZERS.com

In terms of musical expression, there are hardly any synthesizers that can keep up with the character and charm of a CS-50 / CS-60 / CS-80. They offer heaps of performance options and create a unique sound universe that is still looking for its equal. 3 (!) LFOs (sub-oscillator, PWM, ring-modulator), 3 (!) envelopes (VCF, VCA, ring modulator), the parallel dual filter, the ring modulator, the ribbon controller and the touch / pressure dynamics: These all guarantee that vivid sound that is still out of reach of modern technology.

Black Corporation Deckard's Dream?

This rack synthesizer caused quite a stir a few years ago: the quasi-rack version of a Yamaha CS-80 called **Deckard's Dream**. What is to be credited to the company Black Corporation: In terms of sound architecture and optics, they stuck to the original as much as possible. Their instrument delivers a CS-like replacement for the modern synthesizer studio. Good sounds, compact, relatively affordable.

Of course Deckard's Dream is not a CS-80, it's not a CS-60, not even a CS-50. What would one might expect? The elaborate (and expensive) hardware of a vintage Poly-CS-Synthesizer shrunk in the smallest of spaces … how should the modern sound have that much desired *vintage character* without the appropriate massive vintage hardware?





Deckard's Dream

... or DDRM, features eight voices, each with two identical layered parts consisting of a 100% analog voltage controlled oscillator made with discrete waveshapers, analog lowpass and highpass filter (each with their own cutoff and resonance settings,) noise generator, unique multi-segment filter envelope, and VCA + ADSR envelope.

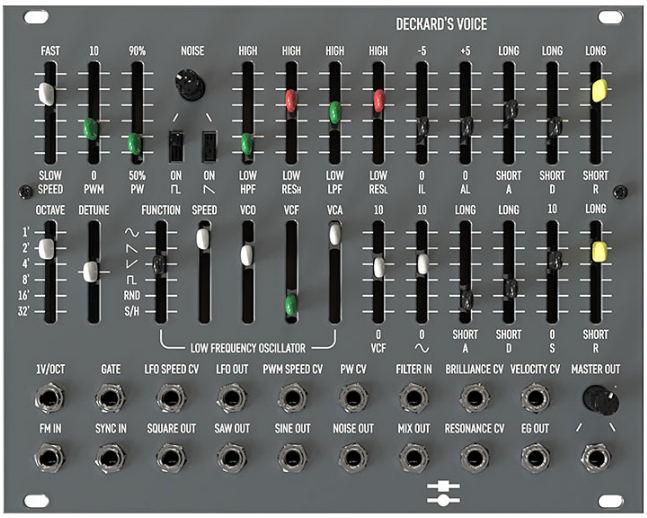
Graphics (c) black-corporation.com

GREATSYNTHESIZERS.com

Nevertheless, Deckard's Dream is a serious musical instrument. And since only few people are prepared (or able) to raise the required 20,000 USD / Euros for an original Yamaha CS-80 today, the modern rack version, even if it may sound different to the original, is not a bad alternative, not at all.

It's a bit surprising that the all-important CS ring-modulator can only be found in **Deckard's Dream Effects Expander**. Calculating the costs for the modern 8-voice rack synth plus its effect expander, you'll realize that you get close to what needs to be paid for a Yamaha CS-50 nowadays. However, if you're looking for the decisive *original* CS sound character, we'd decide for the CS-50.





Deckard's Dream Effects Expander

... is a great complement to Deckard's Dream adding an envelope controllable Ring Modulator, Chorus, Tremolo, Delay, and Reverb effects.

Deckard's Voice

... is an entry level semi-modular synth for eurorack systems. Sharing the same paradigm and circuit as its bigger brother DECKARD'S DREAM, trimmed down for eurorack and supplemented with the flexibility available only in a modular format.

Graphics (c) black-corporation.com

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Finally, however, there's **Deckard's Voice** – a single voice of Deckard's Dream in Eurorack format. What makes this Eurorack module so appealing: Deckard's Voice is a CS-like synth that has *modular* options. This opens up new musical possibilities no original Yamaha CS synthesizer can offer.

SY-1 / SY-2 and CS-50 / CS-60 / CS-80 synthesizers today

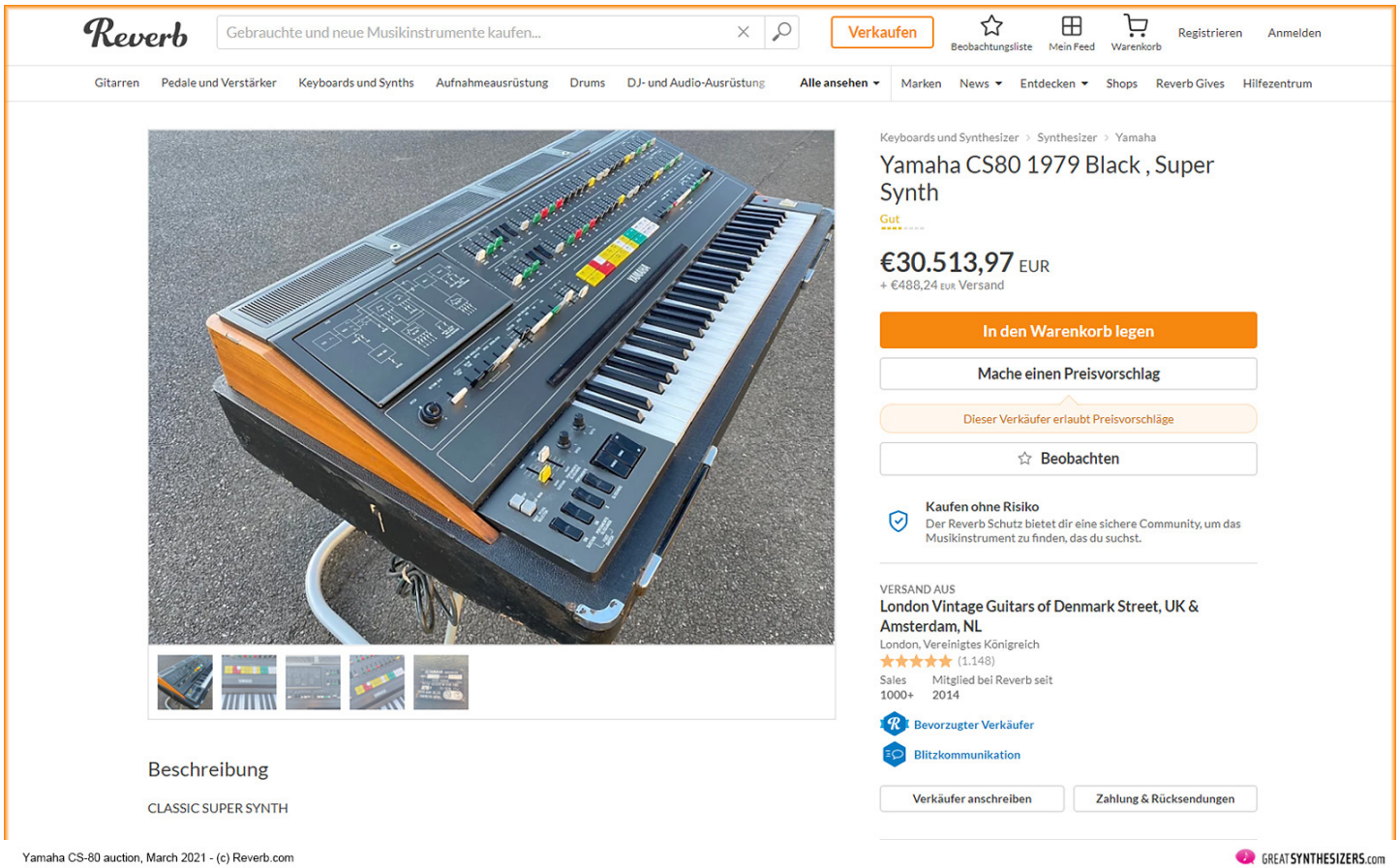
If you like the inimitable – not necessarily beautiful, but *special* – sound character of the early SY and CS series, you are currently facing a blinking red light symbolizing the possibility of an empty second hand market.



Yamaha CS-60 polyphonic synthesizer / SY-2 monophonic synthesizer

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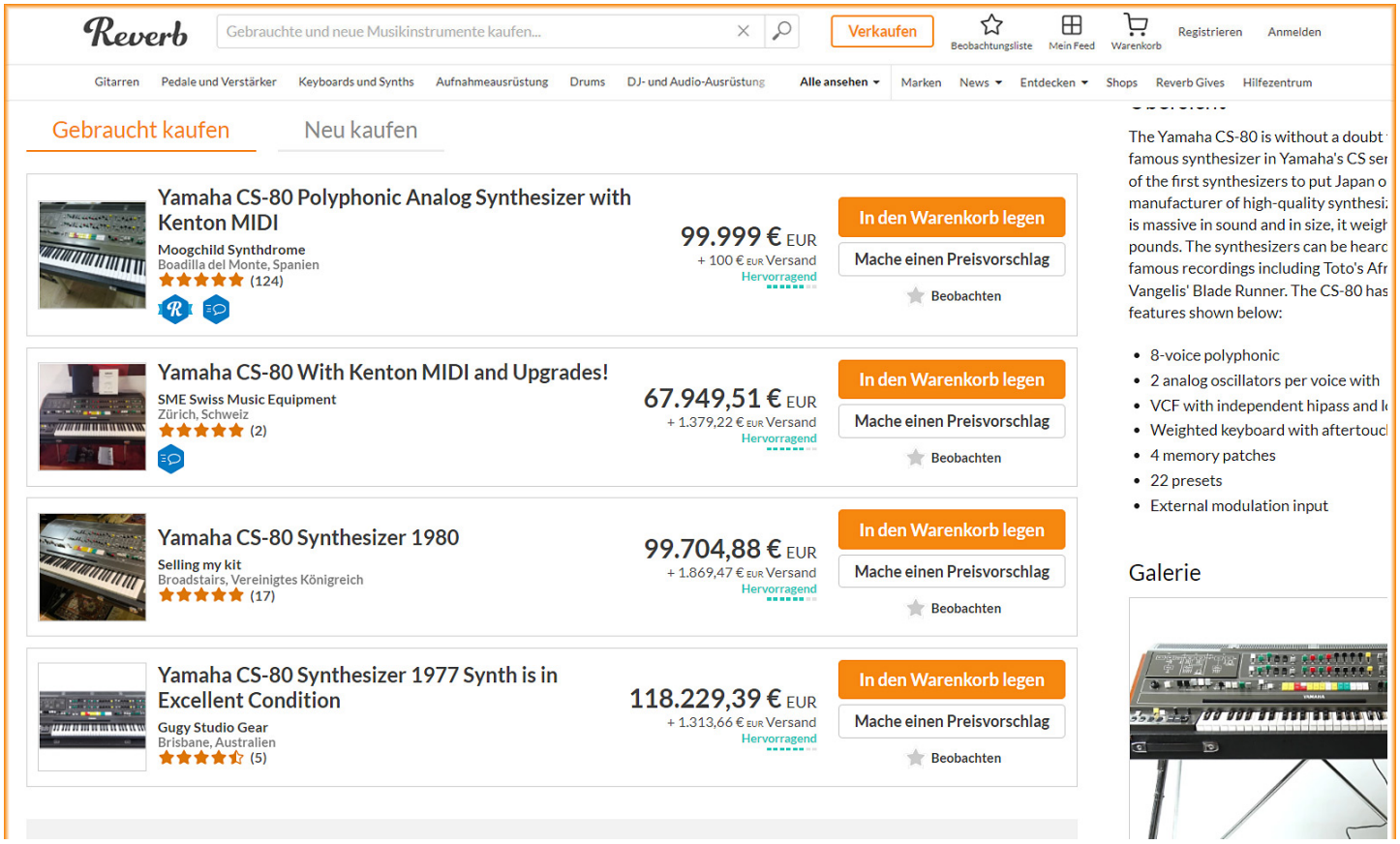
The CS-80 has practically disappeared from the market (ending up in large and small studios, and – sometimes – with speculators). Its current value can hardly be estimated, it is worth at least 25,000 Euros ...



Yamaha CS-80 auction, March 2021 - (c) Reverb.com

GREATSYNTHESIZERS.com

... or maybe 100,000 Euros / USD. Some of those over-priced auctions appeared early 2022, reflecting the current “Vintage Synthesizer Speculative Boom”.



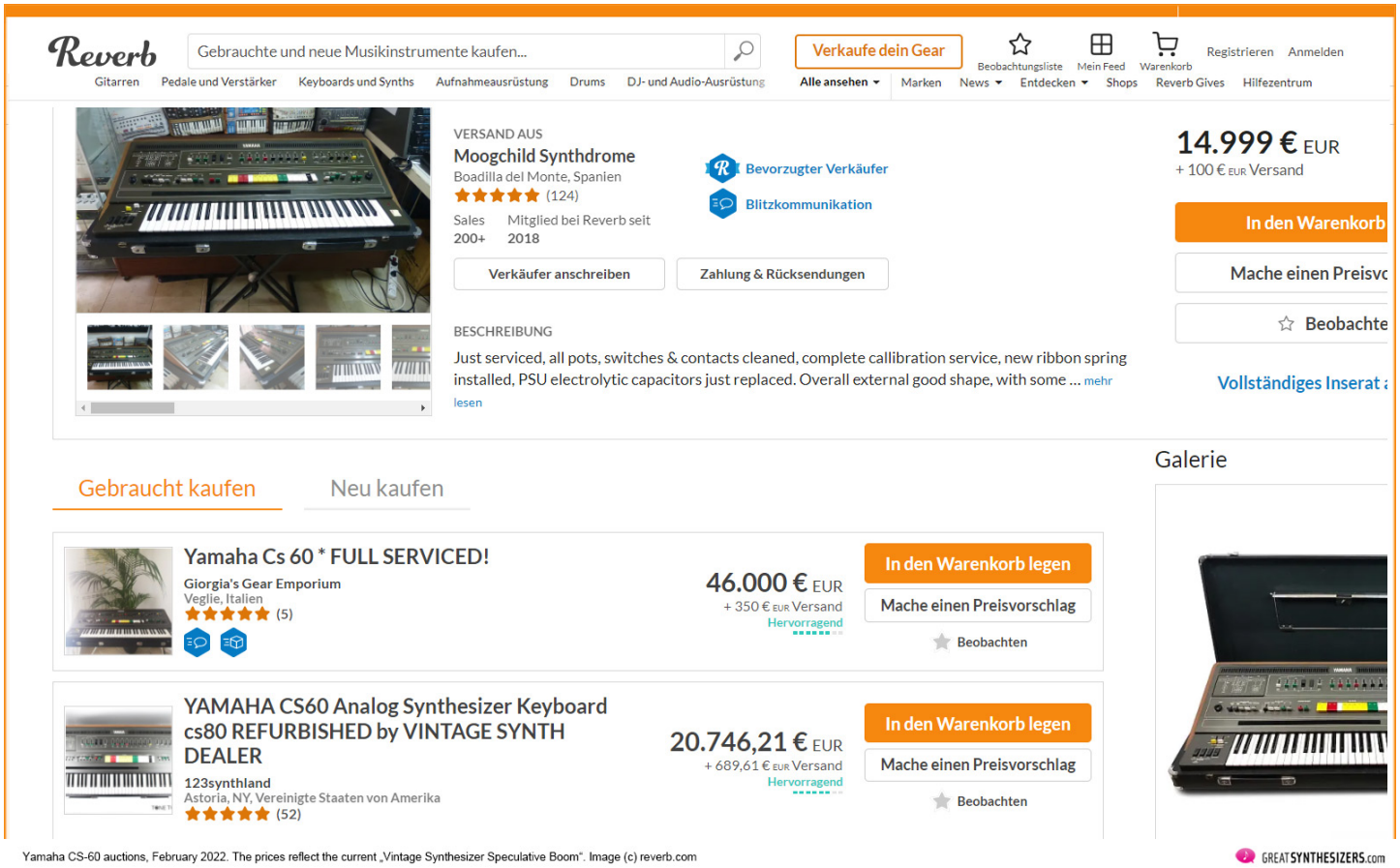
Yamaha CS-80 auctions, February 2022. The prices reflect the current „Vintage Synthesizer Speculative Boom“. Image (c) reverb.com

In the meantime, the CS-60 has also become a rarity, its price climbing into the price range of 10,000 – 20,000 Euros (and above) ...



Yamaha CS-60 auction / November 2021 (c) reverb.com

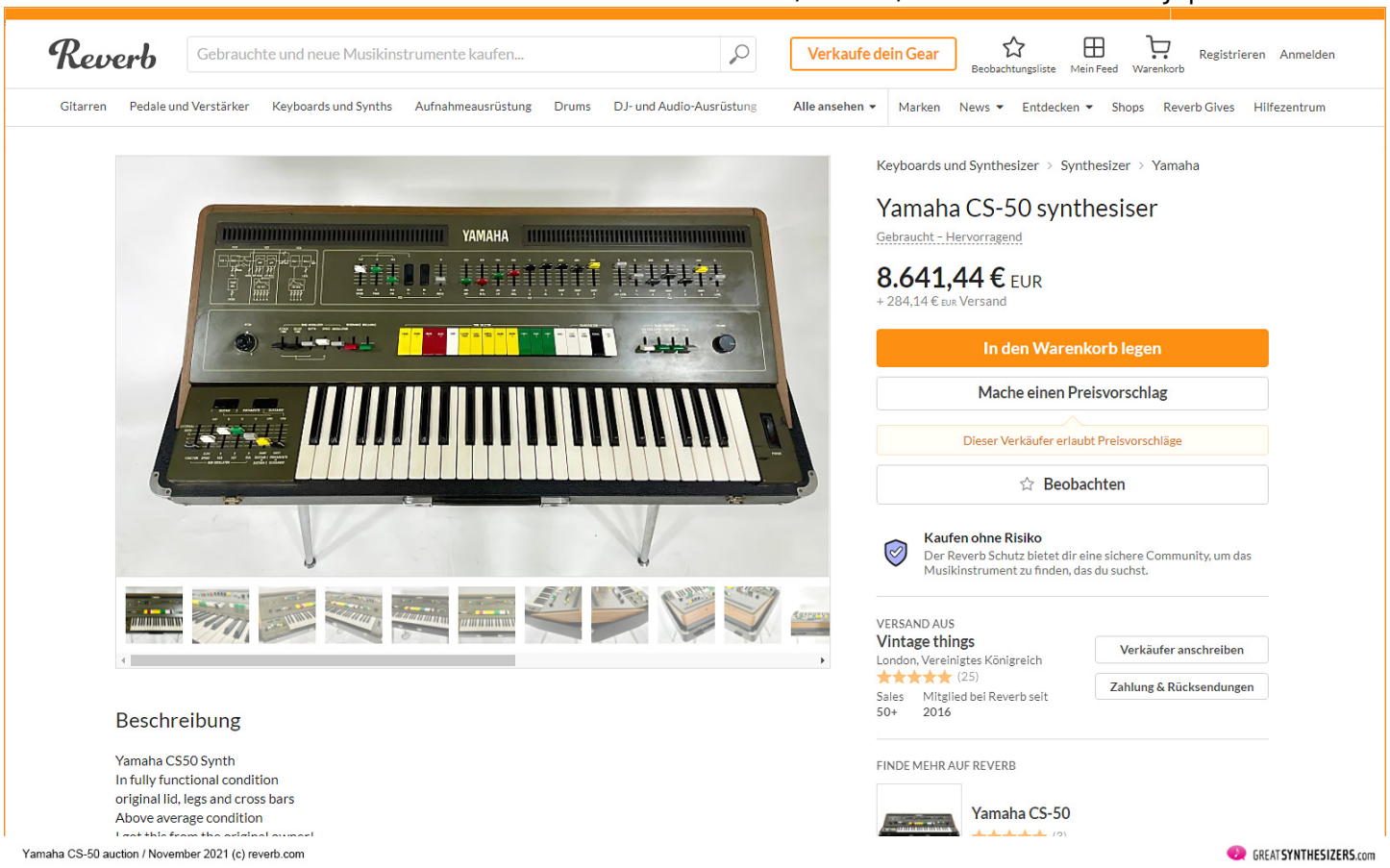
GREATSYNTHESIZERS.com



Yamaha CS-60 auctions, February 2022. The prices reflect the current „Vintage Synthesizer Speculative Boom". Image (c) reverb.com

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And even the small CS-50 has begun to increase in value. While several units of the 4-voice synthesizer were still available for approximately 1,500 Euros in Italy in the summer of 2020, its market value in Central and Northern Europe peaked out at over 5,000 Euros and more.



These estimations may or may not be relevant, but they indicate that CS-50 and CS-60 are – with some luck – *still* available right now. Buyers would be well advised to purchase one if the opportunity arises. Those instruments will be gone completely in just a few years.

And now – having come full circle – we're back at the SY-1 and SY-2, which can bring significant aspects of the glorious vintage CS sound into your studio at a fraction of the cost of an expensive CS-50 / CS-60 / CS-80.

Thanks to Richard Lawson (RL Music) and Tony Miln (Soundgas) for additional photo material. And many thanks to Stefan Herr and LesIndes for additional sound material.



50+ minutes of audio files are attached. It's a broad mixture of Yamaha SY-2, CS-50, CS-60 and CS-80 samples, which should make it clear how strongly the typical CS character is reflected in *all* instruments. Some of the CS-60 sound files are (c) by Stefan Herr. These demos were recorded in one take only, with stereo-delay and equalizing. All CS-50 sound files are (c) by LesIndes.

In 2026, two more CS-60 soundfiles were added. They focus on the ribbon controller on the one hand, and on noise on the other. When controlled via Kenton MIDI, the CS-60 is – with its white noise, filters, LFO, and ring modulator – an amazing percussion synthesizer. In addition to the Yamaha CS-60, the EEF Modular System, Korg Poly-61 and OSCar Synthesiser were also used.

1. Big Little Brother (c) Stefan Herr
2. Ringmod Jingle
3. CS-Lead 1 (Mix)
4. CS-Lead 2 (Mix)
5. LFO-Modulation
6. Solo 1 (live)
7. Mix 1
8. Mix 2
9. Keyboard Control Pure (c) Stefan Herr
10. Sour Sweet Symphony (c) Stefan Herr
11. Solo 2 (Kenton MIDI)
12. Sine Wave (Extra Bass)

13. Note C Only 1
14. Note C Only 2
15. Mix (TR-808)
16. Note C Only 3
17. Mix 3
18. Ribbon Controller (2026)
19. Percussion Noise (2026)
20. Indian Harp (c) LesIndes
21. Pad Sound (c) LesIndes
22. Come Shining (c) LesIndes / EOL
23. Crazy Modulations (c) LesIndes
24. Solo 1 (with Poly-AT)
25. Solo 2 (Ring Mod and Poly-AT)
26. FX-Sounds (Kenton MIDI)
27. Mix 1
28. Solo 3
29. Solo 4
30. Solo 5
31. Solo 6 (LFO Speed Mod / AT)
32. Mix 2 (with Yamaha CP-70)
33. Mix (with Roland Juno-60)
34. BandPass (LPF+HPF)
35. Pulse Width
36. All 28 Presets

Yamaha SY-1 / SY-2

Monophonic Analog Synthesizers
with Dual-VCF and Aftertouch

Yamaha CS-50 / CS-60 / CS-80

Polyphonic Analog-Synthesizers
with Dual-VCF and Aftertouch

CS-50: 4 Voices (monoph. AT)
CS-60: 8 Voices (monoph. AT), Ribbon Controller
CS-80: 2×8 Voices (polyph. AT and Velocity), Ribbon Controller

Links:
Origins of the Yamaha Synthesizer
Yamaha Electone Time Line

Vintage Synth Explorer – Yamaha CS-50
Vintage Synth Explorer – Yamaha CS-60
Vintage Synth Explorer – Yamaha CS-80

Yama-huh? Esoteric design aspects of Yamaha CS synths (part 1)
Yama-huh? Esoteric design aspects of Yamaha CS synths (part 2)

Open / Download:
Yamaha CS-60 Synthesizer (4000 x 2400 px)

Compare / Test Report:
Sequential Prophet-T8 – pure analog LUXURY

Video / Yamaha CS-50 (Explanation & Demo / Doctor Mix):

Video / Yamaha CS-60 (Blade Runner Demo / Raymond Castile):

Video / Yamaha CS-60 (Douglas Romanow):

Video / Yamaha CS-80 (Demo / synth4ever):