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PRE/POWER AMPLIFIER

Siltech SAGA C1, V1 and P1

Gaining iconic status in audio circles, this hybrid amplifier boasts a three-box design with rechargeable battery cells powering its preamp and 'interstage' voltage amplifier
Review: **John Bamford** Lab: **Paul Miller**

On seeing Siltech's pre/power combo for the first time you might wrongly assume it incorporates a separate power supply. In practice this unusual design splits the power amplifier into separate interstage (voltage gain) and current amplifier sections. The combo's C1 tube preamplifier features a rechargeable battery power supply as does the V1 voltage stage of the two-box power amplifier. Of course, running the complete V1/P1 amplifier from a battery would be wholly impractical unless you wanted to listen 'off the grid' for only a few minutes. As a result, the P1 is mains powered, albeit with a twist [see boxout, p29].

This radical design concept in the brainchild of Siltech's CEO, Edwin van der Kley-Rijnveld [see boxout, p31], a fresh-thinking engineer who believes obviating the ingress of noise across the entire audio replay chain to be of paramount importance in maintaining faithful and wholly enjoyable music reproduction. His aim was to make an amplifier utterly devoid of deleterious AC mains effects and free of loudspeaker load dependency. Siltech calls it a Structural Analogue Gain Amplifier (SAGA). And no: you don't have to be of retirement age to join the owner's club. But you will need very deep pockets, since the combined cost of the C1 preamplifier and two-box V1/P1 power amplifier is a heady £85,000.

The C1 line preamp first appeared a couple of years ago, while the development of the V1/P1 power amplifier combo to accompany it was first unveiled at last summer's Munich High End Show. It's a 'minimalist' zero-feedback design that employs four selected ECC86 valves, one pair as current source and the other set as the anode follower. The ECC86 is a rarely seen triode dating back to 1958, developed for use in car radios but

manufactured for only two to three years as transistors soon replaced them.

'ONE OF THE BEST'

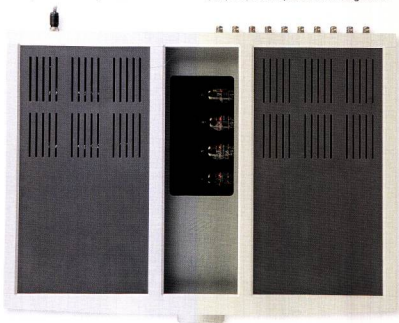
To make a valve for use in a 'wireless' installed in a car's dashboard – used as an amplifier, AM and FM oscillator and powered from a car's electrical system – meant it needed to be highly stable, of low microphony, start up quickly regardless of temperature and be extremely robust, with a long life of around 10,000 hours. Edwin regards the low-noise ECC86 to be one of the best valves ever made and ideal for the low-level inputs of preamps, phono stages and microphone amplifiers. He was able to acquire a substantial quantity of new old stock through a fortuitous contra-deal with Philips. A collector of all manner of test and measurement equipment over the years, Edwin owned a rare item of test gear that even the Dutch electronics giant didn't have in its extensive museum. An arrangement was duly made!

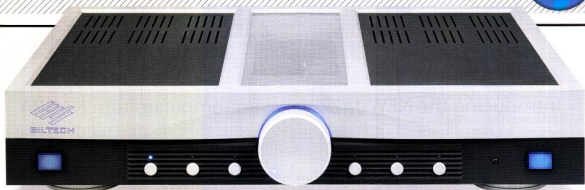
Under the bonnet the C1's audio signal path is point-to-point wired with silver monocrystal cables and has been kept entirely separate from the logic control circuitry that governs the battery charging, input switching and rotary volume control. A plug-top power supply and lead connects to the rear of the C1, the back panel also housing the unit's main on/off rocker switch. The large blue push button on the left of the fascia is the preamp's standby on/off control, while the button on the right labelled 'forced charging' enables listening while charging.

This is normally left off (not illuminated) as the on-board battery provides up to 15 hours of uninterrupted listening. When left in standby, the battery is automatically recharged and conditioned. For convenience, the C1 is supplied with a programmable Logitech Harmony 1100 remote controller with 9cm colour touch screen.

Both single-ended (RCA) and balanced (XLR) outputs are provided, although when

RIGHT: Glass window in the top plate of the C1 preamplifier reveals its four ECC86 valves – rarely seen low-noise triodes originally developed for car radios in the late 1950s





used with the partnering V1/P1 power amp combo, balanced connection is strongly recommended. As in the preamplifier, the V1 voltage amp runs off its 24V safety type lead 'gel' battery supply, and similarly it has illuminated standby and 'forced charging' buttons left and right respectively.

ZERO FEEDBACK

The V1 is a 'zero feedback' design with two independent tube circuits that may be selected according to taste. The substantial 360V tube operating voltage is created by connecting the battery through a high frequency DC-to-DC converter. The supply also offers galvanic separation from input to output and is contained within a sealed metal box inside the V1's enclosure. Hidden on the bottom plate of the V1 is the toggle to switch between pentode and lower-gain triode mode tube circuits. This was purposely made inaccessible to avoid inadvertent switching and consequent

thumps causing accidental damage to speakers – although in the final event the amplifier is so well-behaved that switching on-the-fly is possible. Still, you'll only be able to do this if your equipment rack is of the space-frame type that allows access to the V1's underside.

The P1 current stage amplifier is also a 'zero negative feedback' design, employing bipolar transistors operating in Class A, and galvanic isolation provided by the use of an Apollo LightDrive [see PM's boxout, below]. Says Edwin: 'We believe the natural behaviour of this amplifier, being little influenced by its load, makes it a universal design that's able to get the most out of just about any loudspeaker.'

Once again point-to-point wiring with monocrystal silver wire is employed

'Splashty cymbals and multi-layered keyboards were kept in check'

ABOVE: Elegantly simple design has six input selector buttons and illuminated push buttons for standby and battery/charge operation

throughout, including for the V1/P1's voltage rails. While replacement tubes for the C1 and V1 will need to be obtained from Siltech in matched pairs, it's worth

noting that the batteries are commonly available (and inexpensive) types – and should only need replacing after typically five years use.



CHARMED!

The SAGA was auditioned through the editor's B&W Nautilus 802 floorstanders, the system wired with Crystal Cable's Absolute Dream cables and with balanced connections used throughout. A variety of music files ripped from CD and hi-res 24-bit files at various sampling rates up to 192kHz were stored as WAV files on a memory stick and played via a Cambridge Audio BD player.

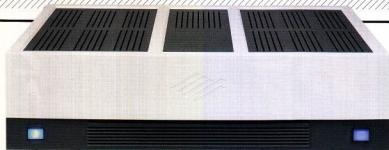
The digital output of the BD player fed T+A's DAC 8 digital-to-analogue converter, yet from the outset we were surprised to hear little or no difference between the Cambridge player and the standalone DAC when A/B-ing them in quick succession. The sound was notably 'clean' and free of treble grain, producing stable images between and beyond the speakers of high-end calibre whether listening to the analogue output of the Cambridge player or the output of the exceptionally fine DAC.

This might imply that the SAGA amplifier is unusually 'source agnostic', sounding exquisite whatever component is used upstream. Implausible? Well, consider that earlier this year, when the SAGA was demonstrated at CES, it wowed show visitors with its music making while being fed by an inexpensive Micromega MyDAC [see page 62]. So it must be doing something magical to make everything sound just great. ☺

APOLLO LIGHTDRIVE

Siltech is on a mission to eliminate noise as far as possible – hence its use of the legacy ECC86 triodes – and power supply noise in particular. Intelligent design can stretch the power supply rejection ratio as far as possible, but Siltech has sought to eliminate it altogether by using batteries – lead acid 'gel' cells – which have the capacity to feed the C1 preamp and V1 interstage (voltage) amp for 12-15 hours on a full charge. However it is simply not practical to run a power amp like the P1 off a battery supply, so Siltech was forced to return to more conventional means, albeit with an unconventional twist. Having experimented with the very best PSU transformers offering near-total shielding, there was always still some leakage from primary to secondary turns and, thus, a mechanism for noise to contaminate the audio ground.

To achieve the lowest leakage, Siltech has refined a 160kHz switching power supply with – necessarily – smaller transformers. Greater stability and further galvanic isolation is afforded by Siltech's other innovation: the Apollo LightDrive. This couples the switchmode supply with the P1's super emitter-follower output stage via a very high efficiency LED light source (developed for car headlamps) directed at a similarly high efficiency photocell (developed for satellite applications). Both LED source and photo cell were built for high UV output and tolerance, respectively, and are encased in a blackened light box to prevent blinding the lucky owner! Levels of capacitive coupling are now extremely low and the P1's bipolar output devices are now largely disconnected from PSU ground currents and switching noise. PM



ABOVE: V1 interstage voltage amplifier forms one part of the SAGA's power amp. As on the C1 preamp, illuminated buttons govern standby (left) and battery-only or battery-while-charging (right)

Further listening in our test system showed that the SAGA is not without its own character, which is what gives it considerable charm. And the fact that it is already being highly praised by audiophiles who have heard it is perhaps further evidence that its sound is individualistic, the amplifier producing a tightly-focused and notably smooth and comfortable sound that you could revel in for hours.

It also delivers intense and vivid

presence with particular clarity through the midband. You might accuse it of sounding 'dry' and unimpressive if giving it only a cursory listen, but listen longer and you'll observe its ultra-dark background and lack of 'hash' that allows prolonged, fatigue-free listening sessions.

Female vocals in particular benefited from the SAGA's uncommon civility and desiccated midband clarity. Anita Baker's 'Sweet Love' from *Rapture* [24/192 download from HDtracks] had great energy and dynamic punch, the recording's artificially splashy cymbals and multi-layered keyboards kept nicely in check thanks to the amplifier's ultra-civilised

demeanour. It proved adept at separating out multi-tracked vocal lines, digging out fine details buried in the overly-busy mix.

ANALOGUE APPEAL

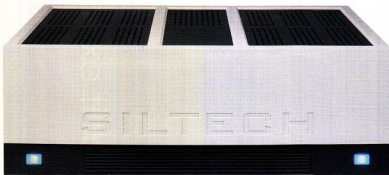
Its invitingly warm midrange and smooth, refined treble reproduction could in many ways be described an analogue lover's delight. Certainly it always appeared confident and comfortable as it painted sonic pictures between the loudspeakers,

although I thought it lacked some of the fruity upper-bass pungency than some listeners might crave.

For example, with Joan Armatrading's 'Willow' from *Show Some Emotion* [A&M

394663-2] the bass energy seemed rather 'sat on', the amplifier's clarity seeming to exacerbate the recording's already dry balance. Yet it would be specious to conclude the SAGA's sound character was 'matter-of-fact', since with Buddy Holly's 'True Love Ways' from the collection *From the Original Master Tapes* [MCAD-5540 DIDD-203] the richly coloured tonal balance of the recording was beautifully preserved. Holly's honeyed voice leapt

'It proved adept at separating out multi-tracked vocal lines'



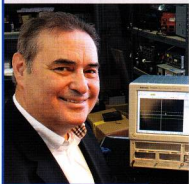
ABOVE: P1 current amplifier must be partnered with matching V1 voltage amplifier. On the left is the power on/off switch, while the standby switch on the right reduces power consumption to 2W

EDWIN RIJNVELD

The history of Siltech covers three decades, although the brand remained something of an underground secret for many years since it was not well represented or marketed in the UK and USA. Edwin van der Kley-Rijnveld entered the scene in 1992, raising finance to save the marque from extinction as it had floundered under its previous private ownership.

Having gained a degree in electronics as a young man, Edwin enjoyed a career in corporate life working for Philips and petrochemical giants ExxonMobil and Shell. Taking over the Siltech BV company was his opportunity to indulge his passion for audio and electronics R&D. Siltech's genesis was Swiss-sourced silver cables for hi-tech medical and aerospace applications as well as high-end audio, but it has branched out to include OEM electronic designs – eg, Sphinx audio components in The Netherlands, and designing the Millennium tube preamplifier for North American audio distributor Fanfare International.

From 1996 to 2000 Siltech also built a limited series of SET power amplifiers called 'SEPA' (Single-Ended Power Amplifier). With power output in excess of 80W and employing Siltech silver-gold internal wiring, these are now highly sought after by audio collectors since only 30 sets were made. Today under the collective banner International Audio Holding, Siltech is a sister company to Crystal Cable, which is headed up by Edwin's wife Gabi, the two brands sharing design and manufacturing resources in The Netherlands.





ABOVE: Siltech's C1 preamp offers six line inputs (one balanced on XLR) with parallel RCA and XLR outputs mirrored by equivalent inputs on the V1 (middle box). The V1 accommodates bi-amped P1s with its dual XLR outs. The P1 (lower box) is the only unit graced with a standard IEC mains inlet; the C1/V1 have two-pin charger sockets

out of the soundstage, and the amplifier preserved the colour and texture of the instruments with vivid clarity and commendable transparency. In the bass, even the lowest notes were crisply defined with no bloating or smear, while the strings were silky smooth.

PENTODE OR TRIODE?

With Eleanor McEvoy's *If You Leave* [Moscodic MOSCD4010] the Siltech amplifier's calm deportment made observation of the musicians' individual contributions easy to follow. Even the busy and boisterous track 'Land In The Water' was kept under tight control, and in the slower-tempo'd 'Don't Blame The Tune' the Hammond organ positioned stage-left and delicious guitar licks stage-right were clearly depicted within their own spaces. The sense of 'air' around them was delightful as the reverb tails disappeared into the background.

In the test system the Eleanor McEvoy recording sounded better with the SAGA operating in pentode mode. Conversely, when listening to the fabulous 24-bit/176.4kHz orchestral recording *Exotic Dances From The Opera* [Reference Recordings HRx HR-71] it sounded too tight, a little congested even, the dynamic performance seemingly allowed much more free rein when the SAGA was switched to triode operation. Which you'll prefer will be as much system-dependent as a

matter of personal taste, although you might curse the inaccessibility of that selector switch if you find your favourite sounding mode varies between recordings.

Comparing the sound quality between battery-only and battery-while-charging operation is something you can do on-the-fly, however. Again, with some recordings any difference in sound quality was negligible, while with others it was considerably more marked. With large-scale orchestral works in particular I thought the sound projected beyond the confines of the speakers and into the room in a far more lifelike fashion, with increased sparkle and vibrancy, when the SAGA was operating purely from its battery supplies. ☺

HI-FI NEWS VERDICT

This is an ultra-high-end amplifier that you really must hear if you're on a quest to assemble the best possible replay system money can buy. Intriguing and unique in its design concept, it's the sort of product that makes audio such an utterly fascinating hobby, proving that there's still so much more to be discovered. The SAGA's calm, unfussy sound quality is sure to win the ears and hearts of many music lovers.

Sound Quality: 86%

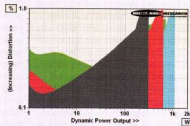
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LAB REPORT

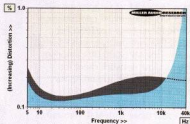
SILTECH SAGA C1, V1 AND P1

Measured separately, the C1 and V1/P1 amplifiers each show a characteristic but not dissimilar behaviour. The C1 offers +30dB of gain (balanced in/out) and distortion – like the V1/P1 – that increases linearly with output level from 0.04%/100mV to 0.4% at 1V while offering 2.6V at 1% THD and 4.8V at 3% THD. In pentode mode the V1/P1 delivers 1W/8ohm at 0.1% THD, increasing to 0.22% at 10W, 0.55% at 100W and 1.15% at the rated 300W/8ohm [Siltech's newest literature now suggests 380W/8ohm, but this seems unlikely]. The stiff regulation of the 'Apollo LightDrive' PSU [see boxout p29] means that continuous and dynamic power are similar, achieving 315W, 630W, 1090W into 8, 4 and 2ohm with momentary outputs into 1ohm limited to 26.3A or 690W [see Graph 1, below]. The 0.08-0.1ohm output impedance is low for a 'feedback-free' amplifier.

Distortion is reasonably 'flat' with frequency through the C1 at 0.35-0.5% (re. 0dBV) and at 0.23-0.37% via the V1/P1 (re. 10W) in triode mode. Pentode operation increases the overall gain from +21.7dB to +26.8dB (balanced mode) but distortion increases slightly more at HF to 0.55% [see Graph 2, below]. Both amplifiers enjoy very low levels of noise – irrespective of battery charge mode – and deliver wide A-wtd S/N ratios of 99.7dB (re. 0dBV) and 97.9dB (re. 0dBW). However, while the C1 has an extremely flat and extended response (±0.1dB 20Hz-20kHz), the V1/P1 is 'shaped' with a -0.15dB shelf from 20Hz-400Hz and +0.15dB boost from 2kHz-30kHz. This falls to +0.06dB in triode mode and is specific to the ECC86s. Readers may view comprehensive QC Suite test reports for the Siltech SAGA C1 preamp and V1/P1 power amp by navigating to www.hifinews.co.uk and clicking on the red 'download' button. PM



ABOVE: Dynamic power output versus distortion into 8ohm (black trace), 4ohm (red), 2ohm (blue) and 1ohm (green) speaker loads



ABOVE: THD vs. extended frequency: C1 (1V out, black trace) vs. V1/P1 (pentode, 10W/8ohm, blue trace)

HI-FI NEWS SPECIFICATIONS

Power output (<1% THD, 8/4ohm)	290W / 360W
Dynamic power (<1% THD, 8/4/2/1ohm)	315W / 630W / 1090W / 690W
Output imp. (20Hz-20kHz, pre/power)	7.5-77ohm / 0.078-0.10ohm
Freq. resp. (20Hz-100kHz, pre/power)	-0.0 to +0.1dB / -0.17 to +0.12dB
Input sensitivity (for 0dBV/0dBW)	740mV (pre) / 129mV (power)
A-wtd S/N ratio (re. 0dBV/0dBW)	99.7dB (pre) / 97.9dB (power)
Distortion (20Hz-20kHz, 1V/10W)	0.35-0.50% / 0.11-0.52%
Power consump. (pre/idle/rated o/p)	50W (charging) 223W/1.56kW
Dimensions (WHD C1/V1/P1)	480x(80/120/160)x340mm