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Reborn**  
The Story of  
Sound Techniques

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# Resurrection of a Console

Danny White, Geoff Frost and  
the Legend of Sound Techniques

By Steve Harvey

**W**hat significant piece of audio equipment is common to “Hey, Jude,” several tracks off the White Album and a slew of career-defining LPs from the likes of David Bowie, Queen, Elton John, The Doors, Deep Purple, Genesis, The Rolling Stones and Nick Drake?

While you think about that, let me tell you a story.

In late 1964, Geoff Frost and John Wood, two staff engineers working at Levy's Sound Studio in London, decided to quit and open their own recording studio after the giant U.S. label CBS acquired the company. Both still in their 20s, they scraped together what money they could, found a space in a former 19th-century dairy near King's Road in Chelsea and got to work. Having only a limited budget, they spent wisely, buying various high-end mics and outboard processors, but electing to build much of the rest, including the electronics for the Ampex tape decks they had acquired and a mixing console of their own design. That console, which they named the A Range, is what ties together those tracks by The Beatles and albums such as *Hunky Dory*, *Sheer Heart Attack*, *Madman Across the Water*, *Morrison Hotel*, *Fireball*, *Nursery Cryme* and so many others, which were all tracked or mixed, or both, through the desk.

Of course, you say, the Trident A Range. Well, no, not *that* A Range.

## A STUDIO AND A CONSOLE

The sonic character of the recordings produced through the late '60s at Frost and Wood's studio, which they named Sound Techniques, earned such a reputation that other London studios began clamoring for their own A Range desks.

Frost set up a workshop upstairs and began to hand-build custom consoles for the likes of De Lane Lea Kingsway and Trident Studios, while Wood ran the studio below. When the red light went on in the workshop Frost and crew would set down tools until the end of the take.

It wasn't long before Tutti Camarata at Sunset Sound Recorders in Hollywood heard about the Sound Techniques A Range and ordered one to enable his facility to work in the new 8-track format. Installed in April 1967, the desk was the first British-designed mixing desk ever sold in the U.S., according to an August 1968 article in *International Broadcast Engineer* magazine. Jac Holzman ordered the second U.S.-bound Sound Techniques A Range for Elektra Sound Recorders in West Hollywood in 1968.

Elektra's desk was almost identical to Trident's, which was installed around the same time. But several years later, rather than buy a third Sound Techniques A Range, Trident Studios—where some of those classic tracks and albums were produced—decided to build their own console. Confusingly, they also called it the A Range.

Later, Sound Techniques also introduced a simpler desk, the System 12, which they manufactured in Mildenhall, England. The desk was a particular hit with reggae studios in Jamaica. The Rolling Stones bought one for Kingston's Dynamic Sounds Studio for their *Goats Head Soup* sessions; Paul Simon also used it to record “Mother and Child Reunion.” The famed Kingston facility Randy's Studio 17 also installed a System 12.

Sound Techniques' studio and manufacturing ceased operations in 1974 after the Chelsea building lease ran out. Olympic Studios acquired



PHOTO: Courtesy of Danny White

Above: Detail of the famed Ernst Turner meters, incorporated into the new Sound Techniques ZR console.

the facility, running it until the early '80s. In all, Sound Techniques built just over a dozen A Range consoles. No complete functioning desks still exist, but two were broken down, and the input modules can still be found here and there.

The upshot is that the Sound Techniques name has largely been forgotten. Indeed, engineer and producer Ken Scott, who worked with The Beatles, Bowie and so many others on the desk, told an interviewer a couple of years ago, “The most amazing array of albums were done through a Sound Techniques board, and no one knows it.”



Left: The beautiful new Sound Techniques console installed at Tweed Recording Audio Production School in Athens, Ga., in late 2019.

Music Row, home to RCA B's famed 1971 API and the prototype Dymaxion console, built in collaboration with Steve Firlotte and Ian Gardiner, now partners in Tree Audio.

"My passion behind Sound Techniques revolves around the magic that the English were able to create in the 1960s and '70s," says White. Seeing the writing on the wall for Music Row as developers started moving in, White was getting ready to leave town when he heard that Frost was selling a recording console. "That turned into him wanting to sell the company and have it with a person who would rebuild it and bring it back," he recalls. "Geoff and I got together in late 2014, and we ended up buying the company. Everything was in a 17th-century carriage house on Geoff's estate in Norwich, England. We had a great week together, packed it into a shipping container, put it on a boat in Liverpool and shipped it through the Panama Canal to Long Beach in California. We had the original designs and blueprints and tons of company history. We had all we needed, including the original input and output transformers, to rebuild the Sound Techniques module the way it was."

White has designed the chassis and mechanical components of the new Sound Techniques ZR and builds the consoles in California. "But the design of this console, with regard to the electronics, is 100 percent English; we stayed true to the English heritage and to the original design," he says.

To that end, White enlisted veteran audio electronics designers Gareth Connor—with whom he had previously worked, restoring the Manor Mobile Helios board—and Graham Milnes, who set up the Sound Techniques Skunk Works at their homes in the north of England. Connor and Milnes each have decades of experience in audio product development, working for Soundcraft, Focusrite, AMS Neve, Calrec Audio and through their own companies. Additionally, Neil McCombie, whose background includes 25 years with Soundtracs and AMS Neve and as an independent contractor, has brought his technical services expertise to bear on the new venture.

Basically, the ZR is an 8-bus, inline monitoring console with fader swap, six mono aux sends, two foldback sends with pan and eight mono/four stereo outputs. But the crux of the classic Sound

PHOTO: Courtesy of Danny White



Above: The original Sound Techniques console at Elektra Sound Recorders, West Hollywood. It was the second purchased by a U.S. studio.

Well, now the Sound Techniques mixing console is back in production, and not as a 500 Series module or a 19-inch rack unit—although the latter is also being manufactured—but as a custom-built desk, known as the ZR. The modern-day reproduction incorporates updated electronics that improve the operational efficiency, maintenance and product longevity while faithfully replicating the sonic characteristics of the original.

What's more, says Danny White, who acquired the company with his partners in 2015, "It looks very much like the original desks

that would have been built in the 1960s." The aesthetic similarity is due in no small part to the desk's classic Painton quadrant faders and Ernst Turner meters; the company acquired both brands and is remanufacturing the components.

### THE NEW-VINTAGE SOUND TECHNIQUES

White, who has established Sound Techniques about 75 miles south of Los Angeles, was once a touring musician with a studio—Formula One, featuring one of Trident Studios' Trident A Range desks—in Phoenix, Ariz. He later owned and operated 16 Ton Studio on Nashville's

Techniques character is in the input module, specifically the transformer-balanced, variable impedance microphone amplifier, inductor-based EQ (thoughtfully expanded beyond the limited original A Range design to meet modern expectations) and the dual class A transformer drive. Beyond those fundamentals, choices such as input channel count, metalwork finish, wood trim, automation and other options, including a fully customized or even remote center section, can be supplied to order.

### THE GUTS OF A DESK

Connor started working on the ZR circuit design in early 2018, calling in Milnes for his inductor and transformer knowledge. “There’s nothing like having a close friend and really top designer having an extra eye over what has already been done,” says Connor. “Without Graham’s involvement, the console would not be as good as it is.”

One of Milnes’ first tasks was to reverse engineer and replicate the Sound Techniques console’s original transformers. “We ascertained that the core material of the output transformer was 50 percent nickel laminate, and we found the gauge of the wire,” says Milnes. “We were able to ascertain all the parameters—the turns ratios, impedances, gain through the transformer—from the original transformers. And by doing comparative tests between the old and the new we got virtually identical results; we were very pleased with that.”

Like the original desk’s channel strip, the new ZR has a nine-position switch for matching input impedance through a combination of 1.5k-, 600- or 60-ohm transformer tap selections, each with three level settings: 7 dB or 15 dB of attenuation, or out of circuit. “It’s quite unique,” says Milnes. “And it’s 100 percent original.”

The input transformer is followed by a discrete amplifier with a line output transformer, a circuit known as the 3035 in Frost’s original design. “The transformer was a faithful reproduction,” says Milnes. “The line transformers have dual primaries, so it’s a class A, discrete, dual-drive circuit.” The original circuit has been slightly tweaked to balance up the power supply requirements and improve the input headroom, he adds.

There is one 3035 between the input and the equalizer section and another following the EQ, both feeding an insert point. “To keep the essence of the original product we chose to leave the transformers in circuit all the time, even if



PHOTO: Bill Gubbins

Above: This photo of Frank Zappa at Sunset Sound Recorders in 1969, at the first Sound Techniques console in the U.S., originally appeared on the front page of the Arts section of the L.A. Times.

***“We were able to ascertain all the parameters from the original transformers. And by doing comparative tests between the old and the new we got virtually identical results; we were very pleased with that.” – Graham Milnes***

the insert is switched out,” says Milnes.

The original Sound Techniques inductor-based EQ was somewhat limited, with no highpass or lowpass filters, nor a mid-frequency section. In consultation with engineer/producers Ken Scott and Dave Cobb, the team have brought the ZR section up to date for modern day users while using the same passive, inductor-based topology.

The LF section originally offered an 80Hz shelf or a 150Hz bell response. Milnes retained the historically well-liked 80Hz shelving frequency and added 30, 50, 90, 160 and 270 Hz bell response selections. “From experience and feedback, we settled on a Q value of 1.8 on the bell,” he says.

The original Sound Techniques HF section gives a very high-Q bell response on the boost with a separate capacitor-based cut circuit offering a shelving response. Milnes has re-engineered the circuit so that the Q broadens more subtly than the original as the selected frequency increases. “You have individual frequency selections for the boost and for the cut. It’s like having two bands, one doing boost only and one doing cut only. You can apply them simultaneously and get some interesting response curves,” he says. With such a flexible

HF circuit available, a lowpass filter was deemed unnecessary, but Milnes added a highpass filter selectable to 40 Hz, 80 Hz or 120 Hz.

There was no original MF section to copy. “That’s entirely of my own development,” says Milnes, who designed a circuit with separate low- and high-mid controls. “It’s inductor-based; I’ve used a series resonant topology.” High-mid covers the 900 Hz through 8 kHz range while low-mid extends from 200 Hz through 1.6 kHz. Both offer  $\pm 12$  dB cut and boost.

The circuitry that follows the input and EQ sections is all modern-day, high-spec operational amplifiers and surface-mount components, reports Milnes. “So it’s wide bandwidth, ultra-low noise and ultra-low distortion. In other words, it’s as neutral as it can possibly be and shouldn’t significantly add any coloration—and I think that was what we managed to achieve.”

One useful facility not often seen in music consoles, says Connor, is that the mix bus outputs, specifically the stereo mix and groups and the echo and foldback sends, simultaneously offer both an electronically balanced and a transformer balanced (via the 3035 dual class A amp) output. “This is good news for engineers



Above: Geoff Frost, founder and owner of Sound Techniques Ltd., was the designer of the original Sound Techniques A Range console.



Danny White, co-owner of the new Sound Techniques and designer of the chassis and mechanical components.

PHOTO: Courtesy of Danny White



The brand-new, just-off-the-line ZR16 console.

who like iron in their outputs,” he says.

Because all of the controls are stepped, notes Milnes, “If you take a photo of the surface you can clearly see the settings, so you can get repeatability if you wish. It’s very quick to set up.”

### STILL BUILT BY HAND

The original Sound Techniques A Range desks were all hand-built by Frost and his helpers with point-to-point wiring. Five-and-a-half decades later, Connor and Milnes have been able to leverage modern design and manufacturing techniques and components that make the new ZR a service person’s dream.

This is where the third member of the electronics team, Neil McCombie, who maintains the consoles at Mark Knopfler’s British Grove facility, has provided design recommendations. “Neil’s input has been most useful in regard

to what a service engineer would like to see or expect to see,” says Connor.

Circuits common across the console, such as balanced inputs, electronically balanced outputs and mix amps, are grouped together in blocks of eight paths on plug-in cards, Connor explains. Thus, complex systems can be created efficiently, with the advantage that much of the signal path comprises PCBs with dependable performance parameters.

“Rather than having expensive, complete spares on the shelf you can have a handful of small circuit boards, like the equalizer,” says Milnes. “If you develop a fault, even someone non-technical could change that out. You don’t even need a screwdriver.”

The modular construction also allows for consoles to be manufactured with a remote master section. “You have the master fader and

controls in what we call the RMS, the remote master section, so you bypass the expense of a center section,” says White. “We’ve already done that. It works very well with a DAW, and a significant amount of money can be saved.”

Sound Techniques has also introduced two 19-inch rack units based on ZR circuitry. The first is the ZR7064CS channel strip, which offers the mic pre and EQ from the console, including the Z-Match impedance and level selector, in a 2U box. “The two-rack unit compressor is coming this summer,” White says. “We’ve already got the compressor/limiter module for the console, so we’ll just pull it out and plug it into a rack, old-school, like an old PYE or EMI compressor.”

As White says, Sound Techniques ZR consoles are already rolling off the line. Indeed, anyone who attended the 2018 NAMM Show likely noticed the enormous 48-input example on display, which Ken Scott demonstrated with a mixing master class featuring several classic Bowie tracks. That console, which is configured for 5.1 work, is now at the Tweed Recording Audio Production School in Athens, Ga., shortened to 32 inputs to fit the space, along with several 8-input sidecars.

Examples of the new Sound Techniques ZR in action can already be heard, too. For example, Bruce Botnick used a ZR sidecar while working on the 50th anniversary reissue of The Doors’ 1969 album *The Soft Parade*, which he originally recorded at Elektra. Bob Rock also used a ZR for parts of The Offspring’s upcoming record. And Dave Cobb tracked a large part of John Prine’s Grammy-nominated *The Tree of Forgiveness* through a ZR sidecar. ■