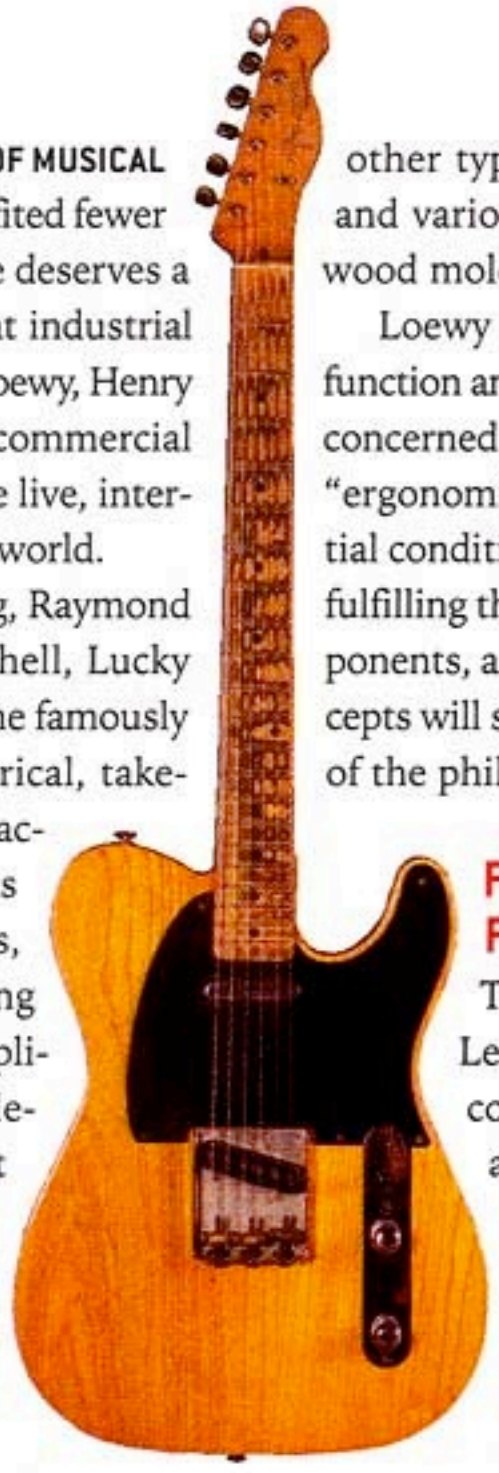
The Genius of Practical Design

How Leo Fender Changed the Way Musicians Work With Their Tools, and Helped Ignite New Styles of Music



LEO FENDER'S LEGACY EXCEEDS THE BOUNDARIES OF MUSICAL hardware. Though his products may have benefited fewer people than did telephones or alarm clocks, he deserves a place in the annals of the 20th Century's great industrial designers, alongside figures such as Raymond Loewy, Henry Dreyfuss, and Charles Eames. Beyond their commercial success, their innovations changed how people live, interact, and see themselves and their place in the world.

Acknowledged as the father of streamlining, Raymond Loewy designed everything from logos for Shell, Lucky Strike, and Exxon to Frigidaire refrigerators. The famously practical Henry Dreyfuss designed the spherical, take-me-to-your-leaderish Hoover Constellation vacuum cleaner (which floated on a cushion of its own exhaust), classic Westclox alarm clocks, John Deere tractors, Thermos bottles, washing machines, and one of the most widely used appliances of all time—Bell's Model 300 rotary telephone in basic black. Charles Eames is best known for the Eames Lounge Chair—perhaps the foremost example of 20th Century modernist furniture. He and his wife Ray also pioneered designs and techniques for producing other types of furniture, as well as pre-fab houses and various products made with new techniques of wood molding.

Loewy described streamlining as "beauty through function and simplification." Henry Dreyfuss was chiefly concerned with practicality, and what came to be called "ergonomics." For Charles and Ray Eames, the essential condition for design was recognizing the need, and fulfilling that need through the latest in materials, components, and construction techniques. All of these concepts will sound familiar to anyone even remotely aware of the philosophy of Leo Fender.

FENDER FOLLOWS FUNCTION

The design maxim most often associated with Leo Fender is "form follows function." It was coined by American architect Louis Sullivan at the tail end of the 19th century, and adopted and refined by many of his successors—most notably Frank Lloyd Wright. In Wright's view, form and function are inseparable. Simply put, a product's design should derive

BY TOM WHEELER

An abbreviated excerpt from his new book, *The Soul of Tone: Celebrating 60 Years of Fender Amps*.

from the manner in which it serves its purpose, rather than considerations of mere ornamentation.

It's hard to imagine a purer expression of that philosophy than Bill Carson's recollection of Fender's approach to design: "Leo used to say, if we've only got a hundred dollars to develop this item, it's got to be reliable, and it's a life or death matter for the musician for that thing to perform every time. We will spend as much of that hundred dollars as necessary to get that. If we've got four or five dollars left over, we'll work on the cosmetics."

Of course, Leo Fender never intended to create one-off art objects. Like Loewy, Dreyfuss, and the Eameses, he designed practical items for everyday use.

"Leo wasn't trying to make these exalted icons of fetishistic obsession," said amp designer and tube specialist Blackie Pagano. "You can tell everything about his philosophy just by looking at his amplifiers, because their form follows their function. This is part of the genius of Leo Fender, and why these designs have an enduring quality."

WEST COAST COOL

The influence of musicians' feedback on Fender's designs is a tale often told. Harder to pinpoint is the influence of the environment and events outside Fender's Fullerton, California, shop. But consider: Few developments in human history were as exciting or as technology-dependent as manned flight, and the aviation industry was headquartered in Leo Fender's backyard. A decade before he patented his first products, more than two dozen aviation manufacturers were already established in Southern California—home to 3,000 licensed pilots, and site of a third of all airplane traffic in America.

The intertwined aerospace and defense industries would keep Southern California on the cutting edge of technology. Over the years, plenty of Fender designers worked in aviation, automobiles, or aerospace, as well as amps and guitars—from Fender's first partner, Doc Kauffman (Douglas Aircraft), and plant manager Forrest White (Goodyear Aircraft) to the technicians and execs from the auto and aerospace industries who joined Fender after its acquisition by CBS.

Southern California was also the center of a building boom in housing, and an accompanying revolution in architecture. Although Fender may not have taken the inspiration for his amp cabinets directly from the squares and rectangles of suburban houses in the Western Ranch, American Ranch, and California Rambler styles, there's no question that those homes and Fender's amps were born of the same philosophy of putting function ahead of decoration.

The post-war spirit of innovation wasn't confined to governments, corporations, or entire industries. It flourished in garages, workshops, and tool sheds, too. The year the Fender Electric Instrument Company was established, 1946, also saw the founding of the So-Cal Speed Shop in Burbank. It's no surprise that Southern California gave birth to both the custom car and hot rod phenomena. Guitar makers and hot rodders have shared a great deal ever since, crafting

ENTER LEO FENDER

It was in this environment that Leo Fender set about imagining the electric musical instruments of decades yet to come. "I consider Leo Fender to be one of the geniuses of the renaissance in design that occurred in America after World War II," said Pagano. "It probably went back to the late '40s, with bebop and abstract expressionism. Then, the '50s started an artistic shift, which ended up in the huge cultural shifts of the '60s. All these things are a continuum."

Despite revolutions in both music and electronics, Fender products have proved their staying power for more than half a century. Much of this is likely due to the fact that Fender's musical tools possessed additional, transcendent qualities that provided pathways to unexplored territories. In the hands of creative musicians, these amps and guitars proved capable of sounds, techniques, and trends beyond Fender's expectations. Examples abound, from high-wire vibrato-bar acrobatics to the glorious distortion of tube amps cranked far beyond their intended volume levels to "student" amps becoming treasured recording tools for famous guitar stars.

Aside from providing gear for stages, studios, and rehearsal garages worldwide, Leo Fender facilitated the groundbreaking artistry of Dick Dale, Jimi Hendrix, Jeff Beck, Stevie Ray Vaughan, and many others. In striving to build the best possible instruments for the players of his time, he built instruments for our time, as well.

And yet the greatest of all testimonies to Mr. Fender's brilliance lies beyond his products' popularity, their timelessness, and even their suitability for radical new techniques and sounds. Leo Fender stands apart from contemporaries who succeeded merely in commercial terms because his amps and guitars helped change the way musicians work with their tools. Most significant of all, they helped ignite whole new styles of music.

While he couldn't have foreseen the global music market's staggering variety of gear, today's multi-billion dollar industry rests on a shift in musicians' attitudes that owes much to Leo Fender. And while he couldn't have foreseen rock and roll, surf music, soul music, Motown, psychedelia, electric blues-rock, country-rock, funk, or other trends, it's almost impossible to imagine modern pop music without his instruments.

NEW TOOLS + NEW ATTITUDES = NEW MUSIC

How did one man's inventive use of tubes, circuits, speakers, and features contribute to rearranging an entire musical landscape? The story goes back to the beginning—to two steel buildings on Santa Fe Avenue in Fullerton, where, in 1946, Leo Fender first put his name on production guitar amplifiers. Over the next 19 years, he spoke often with electronics suppliers, remained well aware of advances in high-end audio, and incorporated some of those advances into his Deluxes and Pros and Twins.

"The history of electronic audio reproduction basically starts with radio, and the earliest triode tubes used in simple, single-ended configurations," explained Pagano. "Later, we see push/pull triodes—and even push/pull transmitting triodes for audio—to achieve higher power levels and more headroom. Push/pull topologies existed long before pentode tubes were developed, but many of the earliest guitar amps were single-ended pentodes—the classic Champ setup. Push/pull pentodes were seen concurrently in higher-powered, more expensive models.

"As a radio repairman, Leo probably fixed a lot of early triode circuits, but his guitar amp manufacture joined the party while the earliest pentodes were current—metal-bodied 6V6s and 6L6s. As successive versions of the pentodes were developed, he utilized them—6L6Gs, 6L6GBs, 6L6GCs, and so on. Each new version generally incorporated a significant increase in specs. More headroom became available to the designer, and, more significantly, to the musician."

As Fender amps increased in available power and versatility, those attributes became industry-wide standards, and new technologies and products found their way into the hands of inventive musicians—with sev-

eral results. Bands got louder. Distortion was added to the guitarist's sonic palette. Ultimately, entire new forms of music emerged.

"At the point where the tools changed, there was also a change in attitude," said Pagano. "The people who adopted the new tools were thinking about their art a little differently than the people who were using the old tools. It was a huge break from tradition, and that blows open doors. Art changes culture, and art is the cutting edge of culture. Today's high art is tomorrow's

mainstream. Leo Fender managed to create new attitudes among musicians. It was true with his guitars, and it was also true with the amplifiers.

"One example is the type of distortion people wanted to hear started to shift. It's an electronic fact that push/pull circuits cancel second harmonic distortion. Instead, odd-order distortion predominates—third, fifth, seventh, ninth—especially when you push them into clipping. And yet, classic Fenders are by no means high-gain amplifiers. I'm

In recent years, Jeff Beck has used Signature Strats like this one.

talking about the type of distortion, not the quantity. I believe this contributed to a shift in taste. It seems now that people are always reaching for more distortion. Look at Marshall's evolution, from basically no distortion to insane levels of distortion. Music has become much noisier in general, and part of that cultural shift—punk and metal, for example—has to do with our becoming accustomed to those odd-order distortions, which, in turn, resulted from evolving circuit topology. We saw this beginning a little bit in the late tweed, and then in the brown, and, especially, the blackface eras.

"So the music is getting both louder and noisier because the evolution of amplifier technology permits it. I think those things are partially responsible for predicating a shift in music. I'm certain of it. Listen to the Sex Pistols' first album. When it came out, I listened to it every day. And that thing sounded like such a snarling mess—so great. And now it kind of sounds tame. Why is that? It's because our perspective has shifted so hugely."

NEW INTERACTIONS WITH OUR GEAR

Aside from triggering shifts in taste and styles, Fender's innovations also helped transform how musicians interact with their gear. Although we take for granted onboard effects and multiple tone controls, such features were unheard of in the early days of amplified guitar. Leo Fender didn't invent tremolo, reverb, or tone filters, but by putting tremolo and reverb in the world's most influential line of amplifiers, and by offering circuits with knobs for bass *and* midrange *and* treble, he accomplished much more than providing useful new sounds.

He encouraged, first, the very idea of the versatile amplifier, and, second, the concept that an amp's performance would

More than a decade after its invention, Jimi Hendrix found new ways to explore the Strat's potential as a creative tool. He favored the relatively rare models with maple-cap necks that CBS/Fender began offering in late 1967.

be determined by its user, not just its designer. In the years BL (Before Leo), you pretty much took what you could get, made the best of it, and delivered whatever sound your guitar produced through that amp. But with Fenders, players became sculptors of their own sounds.

After all, if you hand a guitar player a piece of gear with knobs on it, he's going to twiddle them and see what happens. Guitarists' endless fascination with diverse sounds was sparked in part by Fender's simple yet flexible tone controls, presence knobs, Bright switches, inputs of different resistances, dual channels, and highly adjustable tremolo and reverb. Such features not only permitted sonic experimentation—they made it inevitable.

"It's important to note that Leo Fender's designs reflected a cultural shift, but they also helped to *cause* that cultural shift," stated Pagano. "And this is why he is one of the great designers of the 20th Century. He rethought everything very creatively, and came up with really good solutions, but the most important thing was not any single guitar or amplifier, or any detail about them. By developing these tools, he partially invented the sound of rock. Leo Fender wasn't a guy who just built guitars and amplifiers. He changed cultures."