The New York Times

TECHNOLOGY

Rediscovering a Secret of 60's Sound: Vacuum Tubes

By ROY FURCHGOTT DEC. 19, 2002

BUTCH VIG, drummer, songwriter and producer of the multiplatinum band Garbage, has a state-of-the-art digital recording studio in which two 64-channel mixing boards mesh with the computerized sound-shaping and editing tools he uses to create his lush, layered hit records.

But it's not just modern computers that give his work its trademark sound. For that, Mr. Vig, best known as the producer who forged the grunge sound of albums like Nirvana's "Nevermind," relies on technology that was passé by the time Elvis got out of the Army: vacuum tubes.

"The nature of the tubes sort of have an inherent harmonic distortion that fuzzes up the sound that gives it a warmth and body," said Mr. Vig, who amplifies instruments and vocals with vacuum tube sets. "Tubes, particularly the older ones, have a quality that is endearing."

Yet vacuum tubes -- glass bulbs with internal elements that control electricity in much the same way that silicon circuits do in modern electronics -- also have a following outside the professional recording studio. They continue to endear themselves to hi-fi hobbyists, who love the velvety tones they produce. Like Mr. Vig, many audiophiles are willing to pay premium prices for weighty amplifiers with rows of hot, glowing tubes.

The market for tube-based home hi-fi equipment is a small one, but it has grown steadily over the last decade. Boutique tube electronics manufacturers are now popping up faster than boy bands, and some mainstream audio companies are reintroducing tube gear to their

product lines.

Imported amplifiers or other components start at about $700, while American-made equipment can cost twice that or much more -- for the most exotic models, tens of thousands of dollars. As investments, five-year-old tube sets and the tubes themselves sell at gains that best the long-term stock market performance. As a result, manufacturers are stuffing tubes into every component imaginable, including CD players. There are even a few computer sound cards that include a tube or two.

Audiophiles mostly agree that tube sets sound different from transistorized solid state sets. Fans usually describe the tube sound as warm. There is not much agreement, though, on why it sounds that way.

The prevailing yet highly arguable theory is that while all stereo components introduce some distortion to music, tube circuit distortion is itself musical. "Vacuum tube circuits produce almost exclusively even-order distortion," said Lou Johnson, a partner in Conrad Johnson Design, a company in Fairfax, Va., that manufactures both tube and solid-state music components. "Those tones are essentially one octave apart." So tube distortion is basically in pleasant harmony. "A traditional transistor circuit produces odd-order distortion, so it tends to be discordant," he said.

Other popular theories are that the tube circuit's compression of "dynamic range," which is basically the difference in volume between the quietest and loudest passages in music, is a pleasing inaccuracy. "Solid state can have higher dynamic range, but when you hit the crescendos, it can be so high it will drive you out of the room," said Kevin Deal, an owner of a tube audio specialty shop, Upscale Audio, in Upland, Calif.

Solid state fans argue that while tubes may add pleasant inaccuracies, they are still inaccurate. "Music isn't always pleasant, lush or velvety, or the other things attributed to tubes -- sometimes it's harsh," said Bill McKiegan, vice president for sales and marketing at Krell Industries, an audio manufacturer in Orange, Conn., that makes only solid-state equipment. Krell is so dedicated to reproducing unaltered sound that it provides no treble or base controls on its gear.

Such convictions do not sway the growing number of audiophiles who pay premium prices for tube gear and the individual tubes themselves. "The demand is so big I am going to

run myself into the ground," Mr. Deal said. "We could be open 24/7, like a 7-Eleven to supply tubes and components." The tube amplifiers he now stocks are priced up to $40,000. Amps that were made individually on demand cost even more.

McIntosh Laboratory, an audio manufacturer that had stopped making tube gear by the late 60's, introduced its first new tube amp in 1999, the model MC2000. The company made 560 of them, each priced at $15,000. "We nearly sold out before we started producing them," said Sally Goff, manager of marketing and public relations for the company. McIntosh has since reintroduced tube preamps to its line as well.

As expensive as it may be, tube equipment has been a good investment for many owners. For instance, in the mid-1960's Marantz made a tube preamplifier called the Model 7 and introduced a solid state version called the 7T, for transistor, Mr. Deal said. Both sold for $264. "What's interesting is that same preamp today is worth about $2,500 and the solid state is worth $300."

Mr. Deal, who started selling replacement tubes about seven years ago, said that certain vintage models that are thought to produce the best sound sell for literally hundreds of times their original prices. "A vintage Western Electric 300b made in the 1930's with an engraved base would, in Japan, sell for $2,000 or more." A 300b cost $4.80 in 1943.

But good-quality tubes can cost as little as $20, Mr. Deal said. Many of today's tubes come from Russia, where the military is said to have preferred tube gear because it could potentially withstand the electromagnetic pulse of a nuclear explosion better than solid state.

The life span of a tube varies substantially. A large power tube may last roughly 2,500 hours, while smaller preamplifier tubes may last 10,000 hours, Mr. Deal said. Westrex, the manufacturer of the popular Western Electric 300b tube, offers a five-year guarantee on its $360 newly manufactured tubes.

Some tube hobbyists get around the high cost by scouring yard sales for old gear or by building their own sets from scratch. "This is part of the tube magic: they are very, very simple," said Richard Sears, an engineer and hobbyist in Kenly, N.C., who designed and built a five-tube stereo amplifier for about $250 using a Bombay Company tea box as the cabinet. Kits are available for as little as $200 that require not much more than wire strippers, a screwdriver and soldering iron to assemble. While low-power sets can be simple enough for

beginners, the high power sets can administer a lethal shock to the unwary. "Keep pets and kids away," Mr. Sears warned.

Of the mysteries surrounding tube sound, perhaps the biggest is why it has become popular now.

The enthusiasm may be driven largely by baby boomers who, with retirement in sight, are casting about for a hobby. Not only do tube sets give a blast of nostalgic sound, they also give the owners something to do. Tubes degrade over time, and audio sets often have a bias control that can be adjusted to compensate for the changes in the tubes. "It requires just enough care to keep it interesting," Mr. Deal said.

Indeed, Russell Minchinton, president of a Los Angeles-area clothing manufacturer, said he looks forward to breaking out the screwdriver to tweak his Antique Sound Labs 1003 amp. But he finds other things about tubes attractive as well. It's not just the "very warm, very involving, very human" sound he gets when he cranks up favorites like Ella Fitzgerald and Eric Clapton, he said. Tubes have another quality that transistors don't: they heat up and glow.

"The great thing is you turn the lights down, it's like having a fireplace in front of you," Mr. Minchinton said. "The glowing embers of a fireplace."
