VINTAGE VACUUM TUBES

The 300B Tube Lives Again!

BY HOWARD W. STONE

In this article, Howard Stone first leads us through a nostalgic history of the Western Electric Type 300B audio amplifier triode tube. What follows is a report on the resurrgence of the 300B through "reissues" being produced by several manufacturers. Tube audiophiles will be interested in the results of various listening tests, comparing modern reissues against each other, and against vintage 300Bs. (Editor)

The lights are dim. Several tube audiophiles stand around someone's amplifier, conversing in reverential tones. They must be talking about the Western Electric 300B. No tube — and possibly no component — in the world of tube audio has attracted so much attention over the years than the 300B triode from Western Electric. Some of the finest audio amplifiers in the world use it even today.

The last Western Electric 300B tube rolled off the assembly line in 1988. Was it the end of an era? Some people feared it was. After all, almost everyone had switched to solid-state amps. Only a small group of tube audio aficionados recognized that some of the finest reproduced sounds still emanate from well designed tube amplifiers. Many of their amplifiers used the Western Electric 300B. After 1988, WE 300Bs became very scarce. Tube collectors and audiophiles throughout the world hoarded every original 300B that they could get their hands on.

Other manufacturers began producing their own versions of the 300B in an attempt to fill the void. Early in 1995, Westrex Corporation, who now owns the original Western Electric 300B production equipment, announced the reintroduction of the Western Electric 300B, but a series of delays slowed the actual reissue until the spring of 1997. The Westrex people claim to make the new 300B with the same quality materials and some of the same manufacturing molds and tooling as the old Western Electric 300B. They manufacture the tubes in the same Kansas City plant where they were previously made. Even twelve of the same employees who worked on the old 300Bs — most having worked on that particular tube for over 30 years — are now helping to manufacture the reissue.

THE WESTERN ELECTRIC COMPANY

I became interested in the history of the Western Electric 300B when I first learned that it was to be manufactured again. I wondered whether the new Western Electric 300B really could be as good as the old classic power tube.

The maker of the original 300B is Gray & Barton, an old company founded (before radio came on the scene) to make telephone equipment. Gray & Barton became Western Electric Manufacturing Company in 1872. It was reorganized in 1881 as the Western Electric Company. One year later the Western Electric Company became the manufacturing division of Bell Telephone.

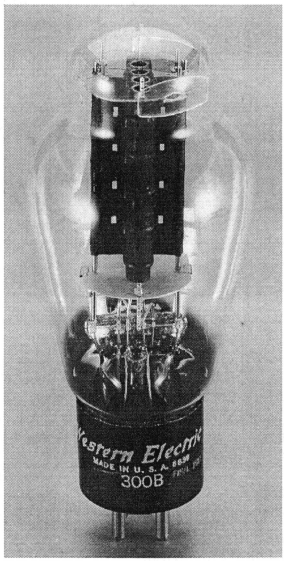

Figure 1. The reissue Type 300B tube.

Western Electric Export Corporation was formed in 1928 to be Western Electric's foreign distributor and its marketing arm for audio equipment and parts. The company became Westrex Corporation in 1942. Litton Industries acquired part of Westrex in 1958.

Convinced of the viability of tubes for amplification of telephone messages, Western Electric began producing them back in 1912. Those early tubes operated telephone repeaters and were first installed in 1913. The original Type A of 1912 to 1913 resembled the DeForest spherical Audion but without the screw-in base; instead, wires extended directly from the base. Since then, Western Electric has manufactured many tubes, most of them for industrial, military, and telephone use.

THE 300A AND 300B

The 300A tube, precursor to the 300B, was first manufactured in 1933 by Western Electric. The 300B appeared on the scene in 1938, identi-

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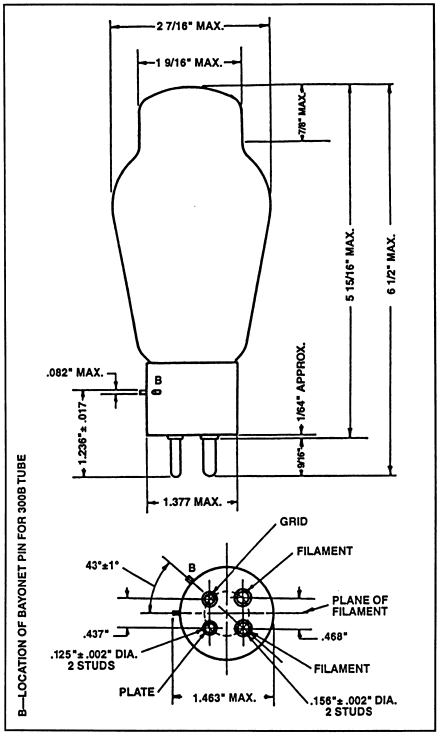

Figure 2. An outline drawing (top) and base detail (bottom) for the 300B. Note the relocation of the bayonet pin in the 300B.

cal to the 300A, except that the bayonet pin in the base was rotated 45 degrees so that the 300B could serve as a replacement for the 205A. The 300A/B had a 5-volt, 1.2-amp filament and a maximum plate voltage of 480 volts. The listed typical characteristics for class A operation are 300 volts at 60 mA with an amplification factor of 3.8 and a power output of 6 watts. Most amplifier builders today run the 300B at higher plate voltages. I scanned a number of recent single-ended triode amplifier designs and noted plate voltages from 337-475 volts, all above the rather conservative ratings of the *Western Electric Electron Tubes-General Bulletin* recommendation.

Western Electric used the 300A/B in the 27A transmitter and the 86A, 86B, 86D, 87A, 91A, and 92A amplifiers, for other military equipment, and for amateur radio. Many movie theaters had 300A/B tubes in their sound systems.

Beyond their obvious use in audio amplifiers, 300Bs found their way into power supplies as voltage regulators. Every once in a while one still turns up in an old junker power supply; unfortunately, I have not been lucky enough to find one that way.

The tube number and name is etched on the base of every 300A I have seen. Western Electric printed the number and name in yellow lightning bolt on early 300Bs. In the 1970s, plain printing replaced the lightning bolt logo. The last batch of tubes returned to the old logo.

Several characteristics have endeared the WE 300B to those of us who are interested in high quality audio sound. In the thirties, no other tube had as much output as the 300B. except for a transmitting tube. The Western Electric 205D could produce about one watt. The same was true of the 45. The 50 tube doubled the output of the 45, but the 300B produced six to eight watts in single-ended operation.

The longevity of the WE 300B is one of its finest characteristics. It is estimated on average to last nearly 40,000 hours. Another important characteristic of the WE 300B is its very low distortion. For example, Eric Barbour tested the WE 300B and found the internal distortion to be one-third that of a RCA 250 tube.

The reissue 300Bs look very much like the old ones, both externally and internally. An outline drawing and base detail of the 300B are shown in Figure 2. The new tube has a round wire getter, while each of the two older 300Bs in my possession has a different type of rectangular getter. My 300A has a still different getter. It is my understanding that some of the later original 300Bs had a round getter as well.

On one of my review tubes I noticed a partial crack in the glass where the outer posts of the tube are pinched into the glass — most likely it occurred in shipping rather than in the tube manufacturing process. I noted no such cracks in my older 300Bs. The reissue has the lightning-bolt print "Western Electric, Made in USA 9552, 300B" on the base. Each tube has its own serial number etched into the base — a new feature.

Each reissue tube comes with a card listing its serial number and the test results for that specific tube: interelectrode capacitances; filament, plate and grid current; plate resistance; grid-plate transconductance; amplification factor (mu); delta transconductance at 4.5 volts; and plate curves for the plate current versus plate voltage. Each matched pair is shipped in a mahogany-stained wood box, sealed with a tag bearing the serial numbers of the tubes inside. They look elegant, but they ought to: their price is $800 for a matched pair.

SINGLE-ENDED TRIODE AMPLIFIERS

American audiophiles are renewing their interest in the use of triode audio amplifiers. The Japanese and some Europeans were there before we were. Most of the old 300B tubes are now in Japan, since most U.S. audiophiles had little interest in them and happily sold them for favorable prices to foreign collectors.

The attention now given to tube amplifiers (especially using the 300B) is shifting from push-pull amplifier circuits of the Macintosh, Dynaco, Heathkit, and others popular in the late fifties and sixties, to single-ended triode circuit designs without the use of any feedback. Most amplifier sections in the very early radios and many early amplifiers used this single-ended triode design.

In the middle of the century, push-pull circuit amplifiers took over from single-ended circuitry because they could produce more power (and frequently less distortion) from the tubes. There

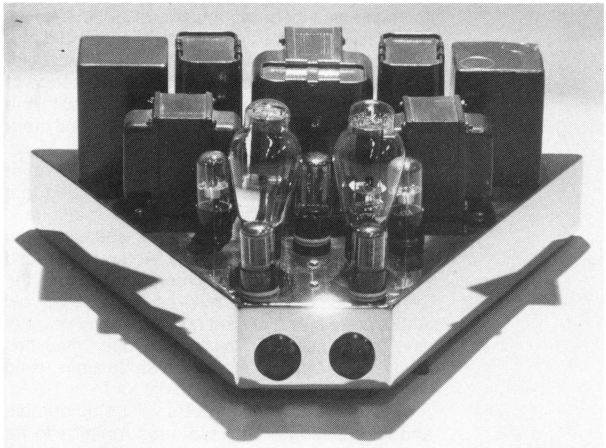

Figure 3. The custom single-ended Class A amplifier constructed by Howard Stone for the listening tests reported in this article.

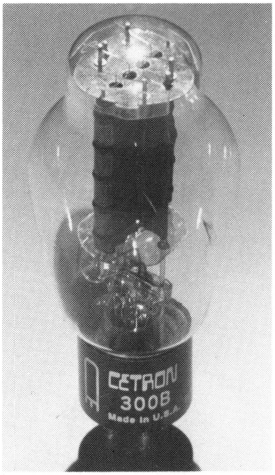

Figure 4. The Cetron 300B manufactured by Richardson Electronics.

was more bang for the buck. Push-pulls were cheaper per watt to produce than single-ended designs. A 300B tube would have double the watt output in push-pull circuitry than it would in a single-ended circuit. However, many tube audio builders believe that a pure and more listenable sound is generated by single-ended triode without feedback circuitry.

The amplifier in Figure 3 uses a circuit that relies heavily upon original circuits designed in the forties and fifties. The difference is that contemporary manufacturers of audio output transformers make, to my ear, far superior transformers. The quality of some of the other components in contemporary single-ended triode amps are also superior to older ones. (Still, some would argue that the "old iron", the old resistors and paper capacitors, are superior to the modern ones.)

I built this amplifier myself, using MagneQuest output transformers. It supplies 7 watts per channel. The power supply relies heavily upon oil-filled capacitors for filtering. The rectifier tube is a 5AR4; two time-delay tubes provide a soft start to the plate and filament voltage of the power tubes. The filament voltages are DC as well. The input tubes are industrial 5691s.

LISTENING TESTS

How does a tube developed 60 years ago match up to modern day audio listening standards?

Rather than simply comparing the vintage WE 300B to the new one by Westrex, I thought it would be interesting to see how both of them compared to a few other tubes. I contacted several makers offering to review their 300B tubes. I also searched for vintage 300Bs to compare with the modern reissues. Most manufacturers were very helpful, though several did not respond.

The most interesting response came from Riccardo Kron, the president of KR Enterprise, formerly Vaic Valve, a manufacturer of several recently designed output tubes. In a letter to me dated September 3, 1995, he wrote, "We, needless to say, feel it would be unfair to compare a new patented tube having a revolutionary technology against an old product that today has been made a legend and consequently some piece for a collector's shelf which best reflects the mind-set of the average reader of *Antique Radio Classified*." Well, readers of A.R.C., since there seemed to be plenty of people out there still interested in dusting off their 300Bs and using them in contemporary and vintage tube amps, I pressed on with my research.

When Western Electric ceased production of the 300B, Richardson Electronics began manufacturing its own 300B as the Cetron brand, shown in Figure 4. The Cetron 300B was included in this listening test. The fourth tube in the listening tests was the Svetlana SV811-3, shown in Figure 5. Although not a drop-in replacement 300B, the SV811-3 is a thoriated-tungsten filament, low-mu, power triode recently designed to fill a need created by the discontinuance of the original Western Electric tube.

We devoted several listening sessions to comparing the various tubes, applying two types of listening tests. To get the most immediate comparison of the tubes, we put one tube after another into the amplifier without an extended warm-up, and played reference compact discs. This allowed the listener in a matter of a few minutes to listen to all of the tubes back to back.

The second test gave each tube at least a half hour of warm-up. The value of this test was that the listening conditions were more like those in the real world. Most tube amplifiers sound better after they have had a chance to warm up for a while; therefore, the second test was necessary. The disadvantage of the second test was that it required better audio memory on the part of the listener than did the first (no warm-up) test.

The listeners were John Bate, a longtime pro-

Figure 5. The Svetlana SV811-3, a thoriated tungsten filament low-mu power triode, designed to fill a need created by the discontinuance of the original 300B.

fessional in the field of audio who works for the renowned Bay Bloor Radio in Toronto; Karen Stone, a music lover with a trained ear; and me. The brands of tubes were not revealed to the listeners. The same CD tracks were played for each test, as follows: Track 1 of Holly Cole's *Temptations* CD, Track 3 of Faure's *Requiem* by The Cambridge Singers, and Track 2 of Wynton Marsalis' *Standard Time Vol. 3.* The results follow.

TEST RESULTS

First of all, the Svetlana SV811-3, as previously mentioned, is not a 300B tube but was recently developed to fill a place very much like the one the 300B has found in the audio market. Therefore, it is not entirely fair to compare it directly to the 300B, but its similarity, new design, and inexpensive price (relative to the 300B) made it a valuable inclusion in this study.

The responses to the SV811-3 were very positive. The SV811-3 in a single-ended triode amplifier provides more power than the 300B. Its bass went slightly deeper than with the 300B tubes we were playing. The sound was natural and pleasing to all three listeners. Even though the SV811-3 was not the first choice of any of the listeners, it is an excellent value. I, for one, am planning to build an amplifier specifically designed to use this tube.

When the Cetron 300B was first turned on in the cold listening test, two of us preferred it to the old Western Electric 300B. After it had been on for a while, all three of the listeners were impressed with the sound. Again it was not the listeners' first choice, but was rated as "very close" to the old and reissue Western Electric 300Bs. Its sound was a little more compressed than both the Western Electric 300B and the reissue 300B and did not seem to envelop the room as fully as the other 300Bs. Nevertheless, its sound was lush, robust, and distinct.

The original Western Electric 300B did not sound as good to the listeners when it was cold. But, after warming up, it had a definite sense of more air and more depth of field than with the Cetron. The sound was also less grainy and more lush. It sounded superb to all three of us. Music that was delicate sounded delicate. The mid-range was awesome. Also, you could listen to it for long periods of time without listener fatigue.

The reissue 300B by Westrex sounded very close to the vintage WE 300B. Again it was lush sounding. We heard slightly more volume from the reissue 300Bs, but that may be because my old 300Bs are a little tuckered out from many years of use. The mid-range in the reissue tube, which has always been what single-ended triode amps using 300Bs were noted for, was "to die for."

Whether the reissue 300Bs will be as durable and long lasting as the old ones remains to be seen. I have listened to the reissues for about 150 hours, only a small fraction of the thousands of hours the old 300Bs were built for. Westrex has succeeded marvelously in reproducing the legendary 300B, and future tube audio amplifier lovers will have them to thank.

The quality of the other tubes we tested was very heartening. There seems to be enough interest in the 300B and like tubes to keep companies like Richardson Electronics (Cetron) and Svetlana in the business of developing power tubes for those of us who like the "tube sound."

Well, I have to get back to the new amplifier I am building. If any of you comes up with 300Bs that you don't need, please give me a call. I could use them for a future amp that I am only dreaming about now.

Keep your soldering irons warm. The 300B lives again!

Photo credits: *Andy Anderson and Westrex Corporation.*

Special thanks to Richardson Electronics, Svetlana Electron Devices, Westrex Corporation, Karen Stone, and John Bate.

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(Howard W. Stone, TCU Box 298130, Fort Worth, TX 76229)

Howard W. Stone has been a valued contributor to A.R.C. for over ten years, and has been collecting radios and tubes since the late 1970s. His interests are primarily in prebroadcast wireless, crystal sets and early twenties broadcast sets. An ardent love of jazz and choral classical music led him to his interest in tube amplifiers. He is a professor at Texas Christian University, Fort Worth, TX 76129.