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RB300-3CX High Performance Audio-Triode

THE RB300-3CX HIGH-PERFORMANCE TRIODE is a rugged, long-lived, extremely compact, external anode electron tube. It uses a metal/ceramic construction very successfully employed in the broadcast industry for decades. Among its unique characteristics are:

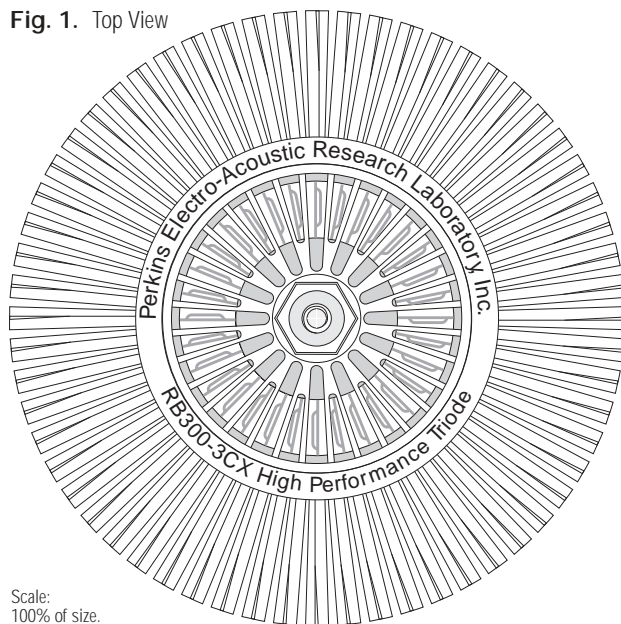
- very robust mechanical construction that features a precisely constructed, positioned and mechanically stable control grid, essentially free from the resonances that plague conventional designs. See Fig. 3, for a 150% cross section of the tube
- a μ of 8, higher transconductance, g_m , and lower plate resistance, r_p , than conventional receiving tubes such as EL34, 6550, KT90, 845, 211, etc.
- an indirectly heated, high efficiency, oxide-coated cathode capable of short-term-peak current outputs in excess of 3A
- a modest filament-power requirement; only 2.6A @ 6.3VDC
- silver soldered or brazed, solid copper construction throughout
- large area, heavy gauge, solid copper heatsinking connected directly to the anode.

Convective dissipation is in excess of 125W per tube while quiet, low air-velocity fan-cooling will better than double that figure. Figs. 1, 2 and 3 detail the tube's construction while Fig. 5 shows a cross section of the forced-air cooling/high-voltage isolating arrangement for a push-pull pair of RB300s.

Running a B+ on the order of 700V, a class AB₁ output power of approximately 500W derives from two pairs run in push-pull-parallel. The current-invariant, class A₁ power for this configuration is approximately 150W, more than enough to handle the information-rich, lower amplitude portions of the music envelope in a most musically satisfying way.

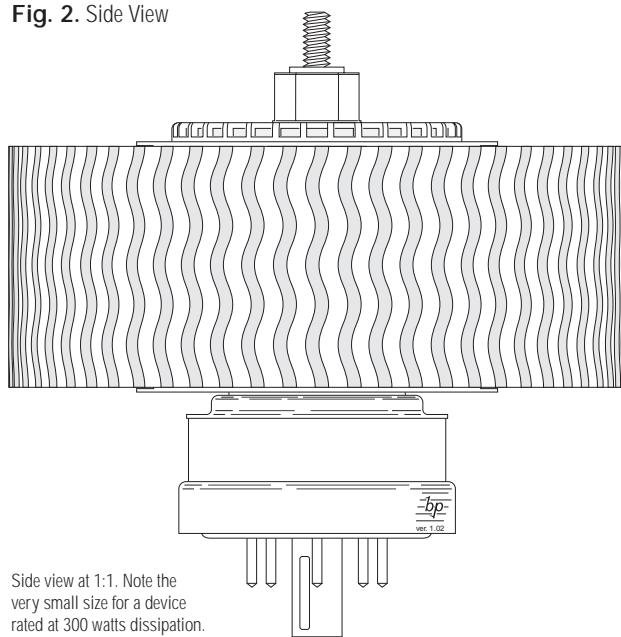
About the size of a hockey puck, the RB300 is decidedly different from conventional, glass tubes. Setting aside the undeniable aesthetics of "glowing glass," these enclosures present a serious obstruction to the penetration of infra-red radiation. In fact, it is usually the glass that first limits plate dissipation, not the metal parts contained within such an envelope. Seeking ways to increase the radiant capacity of

Fig. 1. Top View



Scale:
100% of size.

Fig. 2. Side View



Side view at 1:1. Note the very small size for a device rated at 300 watts dissipation.

large transmitting tubes, several companies developed metal-ceramic sealing technologies during the early 1940s.

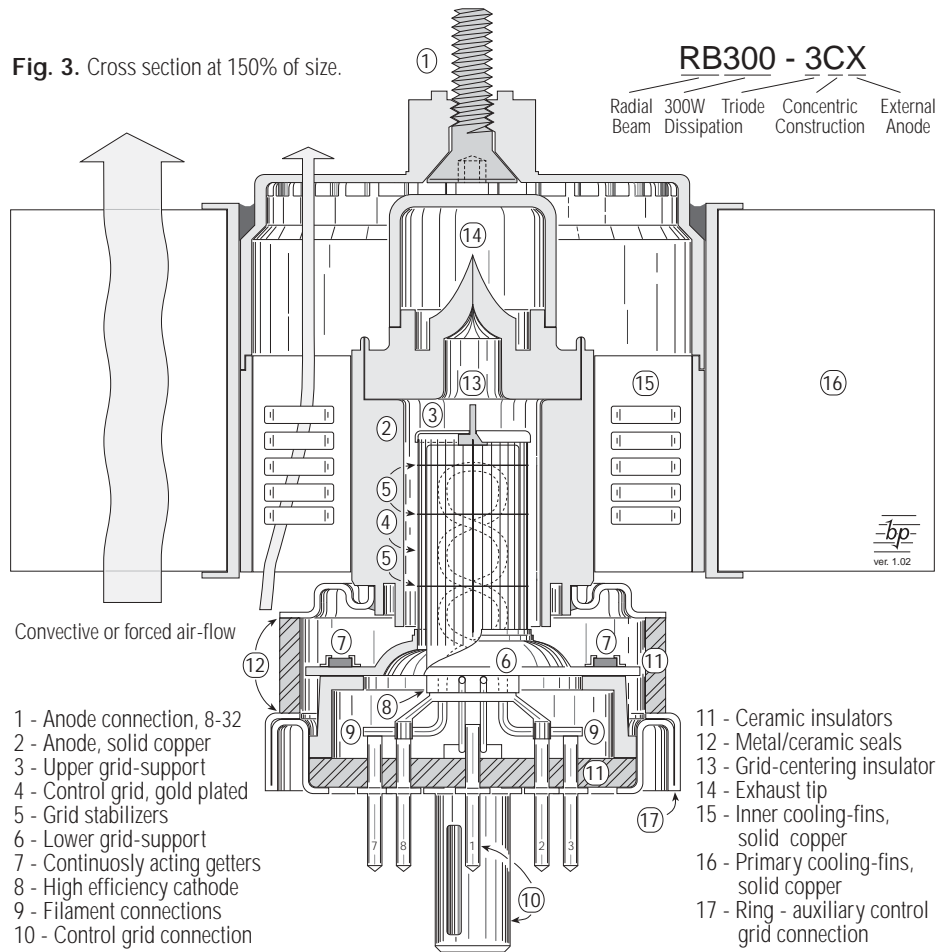
These processes allow designers to construct tubes with the anode configured as an element that *contains* a high vacuum rather than being contained *within* a high vacuum.

When anodes are directly cooled by radiation, convection, conduction and/or evaporation, much more compact designs are possible. By its high power-to-size ratio, the RB300-3CX solves many problems that have plagued designers of large, vacuum-tube amplifiers for better than half a century.

The RB 300's performance is guaranteed by a liberally administered 3 year/10,000hr. warranty subject only to limitations regarding abuse, over-temperature operation and normal, cathode-life effects.

Please call for details.

Fig. 3. Cross section at 150% of size.

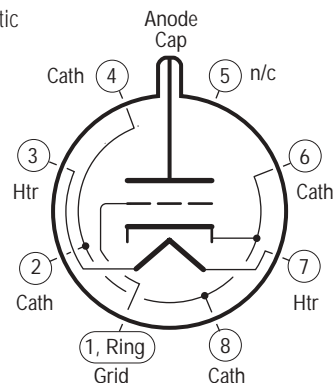


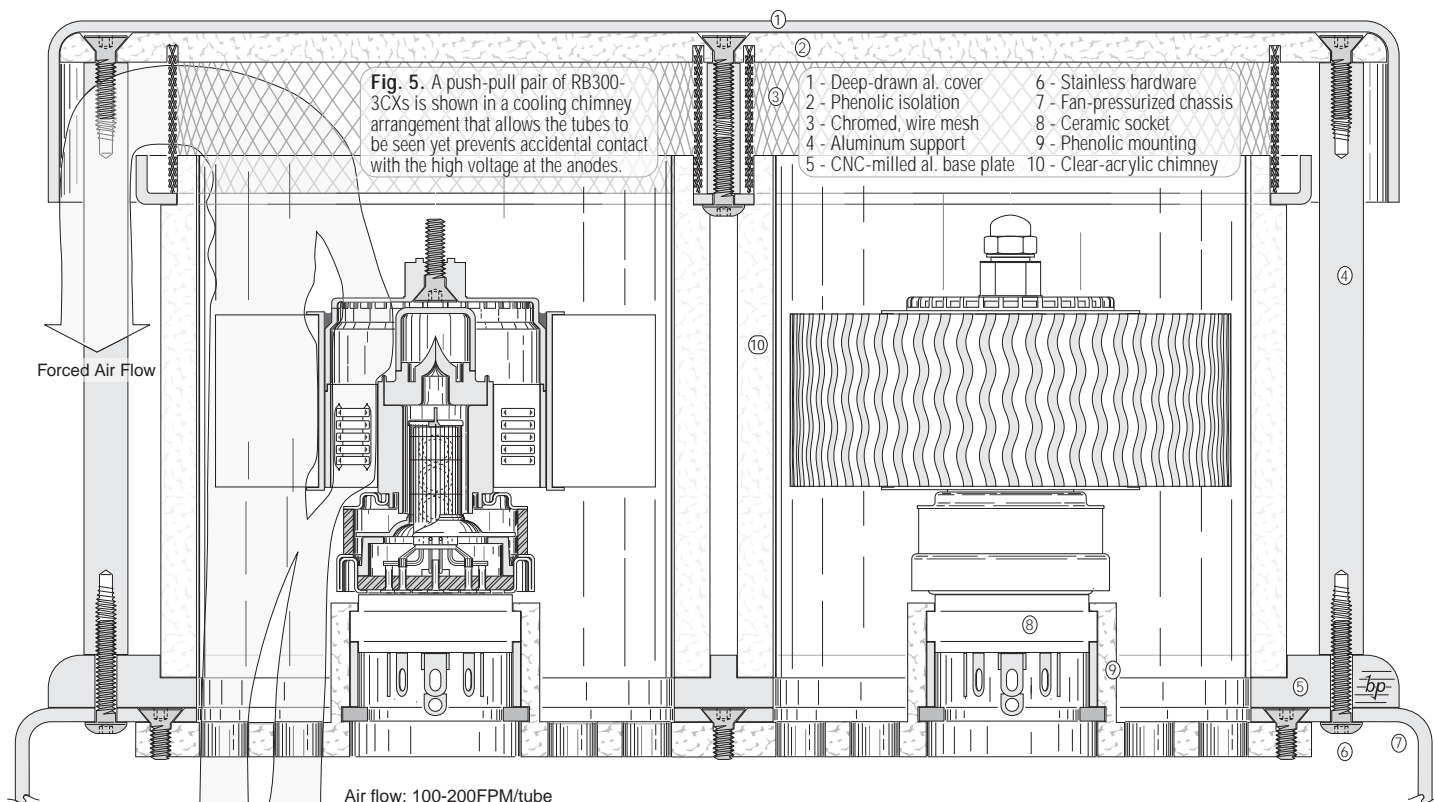
SPECIFICATIONS

| | |
|--|---------------------------------------|
| Heater voltage | 6.3V |
| Heater current | 2.6A |
| Warmup time | 2.0min |
| Basing | Special octal with center-pin-contact |
| Cathode | Oxide-coated, unipotential |
| Heater to cathode potential | $\pm 150V$ |
| Cathode current (max. peak) | 3.0A |
| Anode voltage (max. peak) | 2.0kV |
| Anode dissipation (max.) | |
| Convection cooling | 125W |
| Forced air (200FPM, close-fitting chimney) | 300W |
| Control grid dissipation | 1W |
| Control grid, max. negative voltage | - 400V |
| Operating position: | |
| Convection cooling | Vertical |
| Forced air (200FPM, close-fitting chimney) | Any |
| Max seal temperature: | |
| Sustained | 200° C |
| Intermittent (5min or less) | 300° C |
| Seated height | 2.75" |
| Maximum diameter | 3.2" |
| Weight | 420gms |

| | |
|---|-------------|
| Amplification Factor | 8±1 |
| Transconductance: | |
| ($I_b = 500mA, E_b = 600V$) | 20mA/V |
| Capacitances (grounded cathode connection): | |
| Input | $\leq 15pF$ |
| Output | $\leq 1pF$ |
| Feed-through | $\leq 10pF$ |

Fig. 4. Schematic





FAN COOLING

To many audiophiles, the prospect of fan cooling a piece of equipment is daunting at best. Quite simply, this is because most so-called “low-noise” fans are plainly audible, even all the way across a quiet listening room.

Moreover, the static and dynamic balance of the rotating impeller is often such that significant levels of vibration are launched into the chassis work; ultimately impacting any vibration transducing (microphonic) components in the equipment.

ETRI, INC. manufacture a series of fans that are exceptionally quiet and well-balanced. Available with either ball- or sleeve-bearings these units exhibit useful life spans of tens of thousands of hours while moving 13 or 15 CFM of free air at 50 or 60Hz. respectively.

The two-tube chimney arrangement shown above is effectively cooled by one ETRI 126LH as it will force an air flow of approximately 100 FPM past each of the tubes. Cooling 4 tubes therefore requires 2 fans and the chassis work in the PEARL power amplifiers is arranged around this dictate. Note that the acoustic output from a fan is a noise waveform rather than a regular sinusoid. Noise-signal amplitudes add as the root of the sum of their squares, resulting in an SPL increase of 3dB for every doubling of the number of sources.

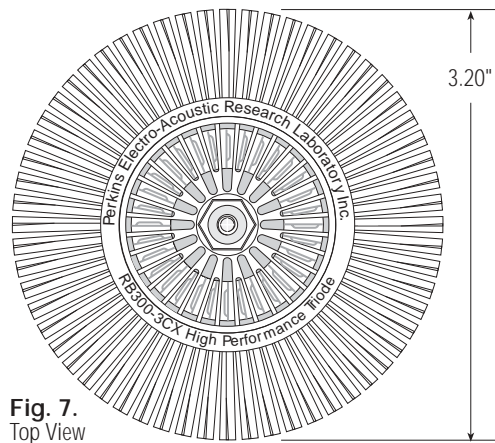
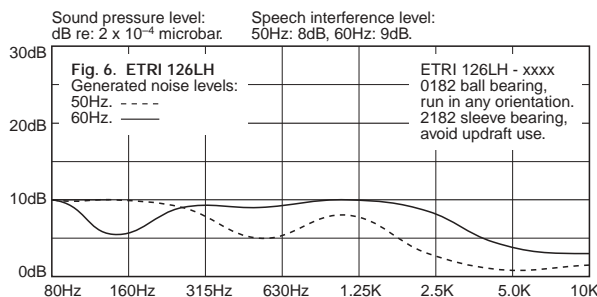


Fig. 7. Top View

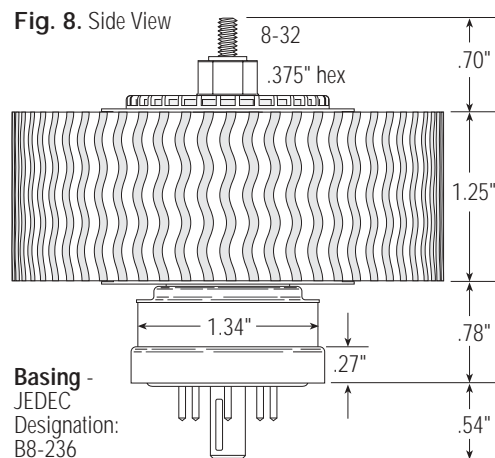
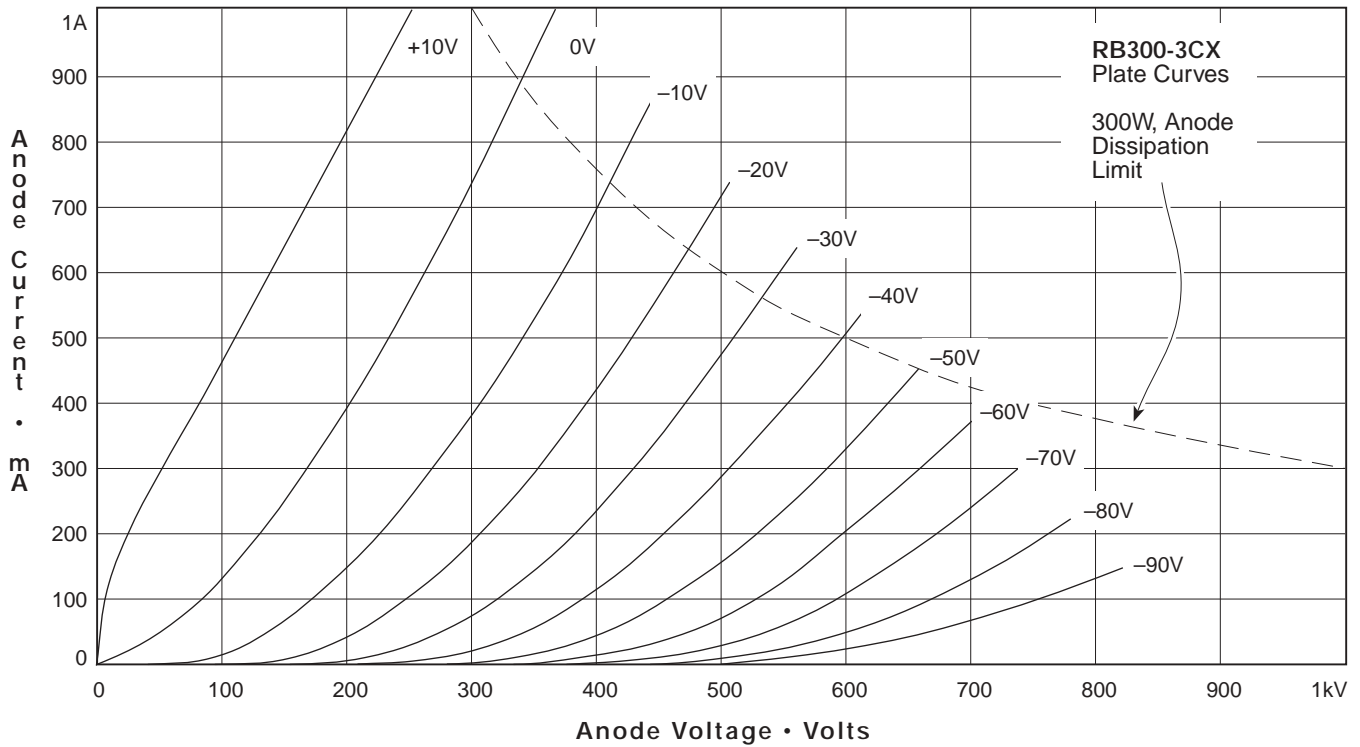


Fig. 8. Side View



APPLICATION DATA

PUSH PULL

SINGLE ENDED

| Class AB ₁ | B+ Voltage | | | |
|------------------------------|------------|------|------|------------------|
| | 500V | 750V | 1kV | |
| Plate resistance | 1.0 | 1.5 | 2.25 | kΩ |
| Plate-to-plate load | 2.0 | 3.0 | 4.5 | kΩ |
| Idle current (per tube) | 150 | 100 | 75 | mA |
| Transconductance | 8.0 | 5.3 | 3.6 | mA/V |
| Control grid bias | 50 | 90 | 125 | -V |
| Control grid drive | 100 | 180 | 250 | V _{p-p} |
| Driving power | 0 | 0 | 0 | W |
| Output power AB ₁ | xx | 75 | | W |
| THD 1kHz | xx | xx | xx | % |
| Current invariant, | | | | |
| Class A ₁ power | xx | 25 | xx | W |
| Anode dissipation: | | | | |
| (Idle, per tube) | 75 | 75 | 75 | W |
| (Max output, per tube) | xx | xx | xx | W |

In Process