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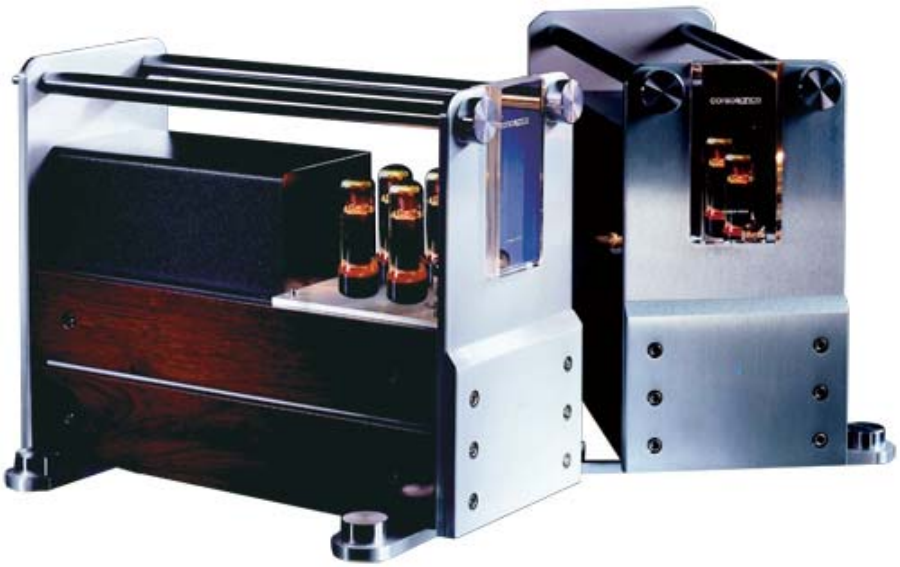

The Consonance CYBER-800 Mono Block Tube Power Amplifier

The Cyber 800 is a 'no compromise' Reference version of the already excellent M800SE Monoblocks. The circuitry is basically the same although the input stage of the Cyber Series is used and the output stage uses 6CA7 tubes instead of the EL34 in the M800. Although these two tubes are basically the same, the 6CA7 gives a better controlled and deeper bass performance when used in this configuration.

Awards – Reviewed by Jimmy Hughes in Issue 39

Anybody who doubts the ability of Chinese manufacturers to compete on the world audio stage, in sonic or material terms, need look no further than this Consonance pre/power combination for an object lesson in delivering the musical as well as the mechanical goods. For all those who cling to the forlorn hope that whilst Chinese built products look the part they'll never match the performance or consistency of their Western built counterparts, these are the stuff of nightmares. The finish and construction speak for themselves and are shockingly accomplished and impressive given the cost. Likewise, the paper performance and power output are well beyond expectations based purely on price. But what won JMH over was the musical performance, a combination of authority and delicacy, unflappable control of orchestral climaxes hitched to wonderfully nuanced and subtle solo instruments. It's easy to become blasé when confronted by a constant procession of equipment whose stellar price-tags demand that they be discussed in hushed and reverential tones. To say that Mr. Hughes was pleasantly surprised by the actual price of the Consonance combo is an understatement. That he only discovered that information after committing his sonic impressions to paper makes their achievement all the more impressive.

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USING TUBES

A. Bias

Bias is a negative voltage applied to a power tube's control grid, to set the amount of idle current the tube draws. It is important to bias a tube to stay within its rated dissipation. Otherwise, you DO NOT need to worry about small deviances from the manufacturer's recommendations. Many times we have customers asking us things like, "I replaced the tubes, the old tubes ran at 35 mA, the new ones run at 38 mA. I'm worried that I have to rebias the amp." This is NOT worth worrying about. Anyway many consonance amps have bias adjustments. In that case, rebiasing is necessary. And some of them are designed so that you do not need to concern yourself with bias. This includes all self sustained single-ended triode hi-fi amps.

B. When should I replace the tubes?

Practically speaking, you should only replace tubes in an audio amplifier when you start to notice changes in the sound quality. Usually the tone will become "dull", and transients will seem to be blunted. Also, the gain of the amplifier will decrease noticeably. This is usually enough of a warning for tube replacement.

C. Blue Glow -- what causes it?

Glass tubes have visible glow inside them. Most audio types use oxide-coated cathodes, which glow a cheery warm orange color. And thoriated-filament tubes show both a white-hot glow from their filaments and (in some amplifiers) a slight orange glow from their plates. All of these are normal effects. Some newcomers to the tube-audio world have also noticed that some of their tubes emit a bluish-colored glow. There are TWO causes for this glow in audio power tubes; one of them is normal and harmless, the other occurs only in a bad audio tube.

1) Most glass power tubes show FLUORESCENCE GLOW. This is a very deep blue color. It can appear wherever the electrons from the cathode can strike a solid object. It is caused by minor impurities, such as cobalt, in the object. The fast-moving electrons strike the impurity molecules, excite them, and produce photons of light of a characteristic color. This is usually observed on the interior of the plate, on the surface of the mica spacers, or on the inside of the glass envelope. THIS GLOW IS HARMLESS. It is normal and does not indicate a tube failure. Enjoy it. Many people feel it improves the appearance of the tube while in operation.

2) Occasionally a tube will develop a small leak. When air gets into the tube, AND when the high plate voltage is applied, the air molecules can ionize. The glow of ionized air is quite different from the fluorescence glow above-ionized air is a strong purple color, almost pink. This color usually appears INSIDE the plate of the tube (though not always). It does not cling to surfaces, like fluorescence, but appears in the spaces BETWEEN elements. A tube showing this glow should be replaced right away, since the gas can cause the plate current to run away and (possibly) damage the amplifier.

D. What is Class A, B, AB, ultralinear, etc?

1. Class A means that the power tube conducts the same amount of current all the time, whether idling or producing full power. Class A is very inefficient with electricity but usually gives very low distortion. There are single-ended class-A, or SE, amplifiers. They use one or more tubes in parallel, which are all in phase with each other. This is commonly used in smaller guitar amps and in exotic high-end amplifiers. Many audiophiles prefer the SE amplifier, even though it has relatively high levels of even-order distortion. Most 300B high-end amplifiers are SE. Negative feedback, which can be used to decrease the distortion of an amplifier, is felt by some people to sound inferior. Most SE amps have no feedback. Push-pull class-A amplifiers also exist--they use two, four or more tubes (always in pairs) which are driven in opposite phase to each other. This cancels out the even-order distortion and gives very clean sound. An example of a class-A push-pull amplifier is the M100S. Push-pull Class A operation usually involves low plate voltages and high plate currents, compared to Class AB operation below. The high currents might tend to wear out the tube cathodes faster than in an AB amplifier.

2. Class AB applies only to push-pull amplifiers. It means that when one tube's grid is driven until its plate current cuts off (stops) completely, the other tube takes over and handles the power output. This gives greater efficiency than Class A. It also results in increased distortion, unless the amplifier is carefully designed and uses some negative feedback.

3. Class B applies only to push-pull amplifiers in audio; it SOMETIMES applies to RF power amplifiers with one tube. It is like Class AB, except that the tubes idle at or near zero current. This gives even greater efficiency than Class A or AB. It also results in increased distortion, unless the amplifier is carefully designed and uses some negative feedback. If careful design is not undertaken, the result may be crossover distortion, which appears at the midpoint of the output waveform and has very bad-sounding effects in audio. Most solid-state audio amplifiers use class B, because the transistors undergo less heat stress when idling.

4. Ultralinear operation was invented by David Hafler and Herbert Keroes in 1951. It uses only beam tetrodes or pentodes, and special taps on the output transformer. The taps connect to the screen grids of the tubes, causing the screens to be driven with part of the output signal. This lowers distortion considerably. It is usually seen only in hi-fi amplifiers that use power tubes such as the 6L6, 6550, EL84 or EL34.

E. Why are different kinds of power supplies used in various tube amplifiers? Why do some use tube amplifiers? Why do some use tube rectifiers, while others use solid-state rectifiers, while still others have electronic regulation?

Tube rectifiers are still used in power supplies of some hi-end amps, because the current a tube rectifier can produce varies somewhat with the load. It is quite different in response from a solid-state rectifier. Many audiophiles also prefer this classic design for much the same reasons. Also, inexpensive solid-state rectifiers can put "hash" into a power supply, because of their slow transient capability while charging and recharging a filter capacitor 50/60 times a second. Special high-speed silicon rectifiers are available at high cost. They

are rarely used in products other than a few high end amplifiers. Tube rectifiers have faster transient response than most solid-state rectifiers, also making them useful in some high-end designs. Regulated DC plate power can be very helpful in a push-pull Class AB amplifier. Because the amp draws greatly different current when at idle and when delivering full power, a regulated supply "sags" less at full power, producing better transient response in the amplifier. It is expensive to regulate the high voltages in a tube amplifier, so it is done only in expensive top-line models. Class A amplifiers have less need for regulation since they draw nearly the same DC power at all times. It is dependent on the circuit design. The only way to see if you need an amplifier with a regulated supply is to listen to it and carefully compare it with similar amps with unregulated supplies.

F. There's all this talk about "parallel feed", "shunt feed", SRPP, "mu followers", and the like. Which should I use? What's the difference?

Parallel feed and shunt feed are the same technique. Basically, a choke is used to load the power tube (usually one, in SE mode), while the output transformer is coupled to the plate of the tube through a capacitor. So, the plate current of the tube does not flow through the output transformer. This can be a very expensive technique to implement, since the choke must be as carefully wound as the output transformer. It does offer a possible performance improvement. SRPP circuits and mu-follower circuits are special designs which use a lower tube (for gain), and an upper tube which serves as the plate load for the lower tube. The upper tube also acts as both a cathode follower and as a constant current source for the lower tube. If properly designed, either circuit can offer improved performance over an ordinary
resistor-loaded tube stage. These circuits are used only in preamp stages and in the driver stages of power amps, usually SE types, in high-end audio. If you want to learn more of the technical details behind vacuum-tube electronic design, we recommend the following books.

We recommend two recently-published books on circuit design, which the novice can derive much information from:

THE BEGINNER'S GUIDE TO TUBE AUDIO DESIGN, by Bruce Rozenblit (ISBN 1-882580-13-3); **and PRINCIPLES OF POWER**, by Kevin O'Connor (ISBN 0-9698-6081-1).