

# True.

**Over the years, countless attempts have been made to design true class A circuits with a reasonable degree of efficiency. None have been successful.**

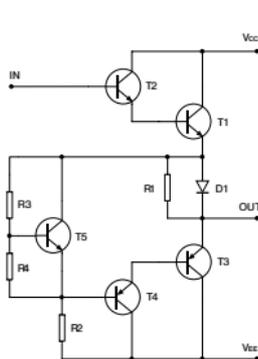
**Until now.**

Crystal Sound System (CSS™) is the name of a new and patented class A transistor amplifier circuit which combines the high linearity and accurate sound of class A with the high efficiency of class AB. The circuit is ingeniously simple and brings the sonic performance of audio amplifiers to a higher level than previously possible, without sacrificing efficiency or producing excessive heat in the way that traditional class A designs do.

Due to its simplicity, the CSS™ patent can be applied to virtually all applications now using class AB amplifiers, including everything from integrated circuits to high power public audio, with only minor alterations to the original design. The result is a more linear and accurate sounding amplifier, which puts less stress on the power supply and reduces high frequency interference, while retaining the stability and high efficiency of the original design.

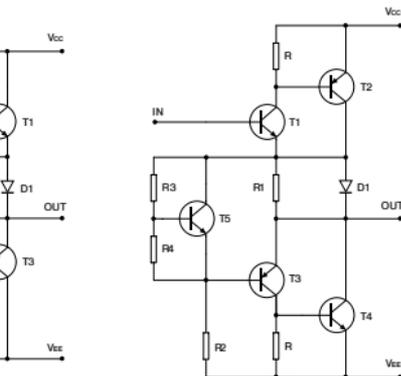
In every product where audio quality is of concern and an amplifier is present, CSS™ can dramatically help improving sonic performance without affecting manufacturing cost.

Two examples of the patented circuit are shown below; one using a Darlington and the other a Sziklai or "complementary Darlington" configuration.



CSS™ applied to Darlington

The amplifier includes a transistor pair (T1, T2), whose effective emitter is connected to the output (OUT) via a resistor (R1) in parallel with a diode (D1). A constant load circuit, consisting of a second transistor pair (T3, T4), a resistor (R2) and a bias circuit (T5, R3, R4) is connected between the negative supply (Vcc) and the output (OUT). The constant load circuit includes a shunt line between the emitter of



CSS™ applied to Sziklai

the first transistor (T1) and the base of the second transistor pair (T3, T4). This shunt line has a bias circuit (T5, R3, R4) which is adjusted so that the output diode (D1) will not conduct when the amplifier idles.

The constant load circuit ensures that  
• A current continually flows through the output resistor (R1).

• The current through the first transistor (T1) will always exceed a lowest value and due to this, T1 will constantly operate in a delimited, generally linear part of its working curve.

• The first transistor (T1) can handle both the positive and the negative polarities on the output. By definition, the amplifier is therefore a class A design.