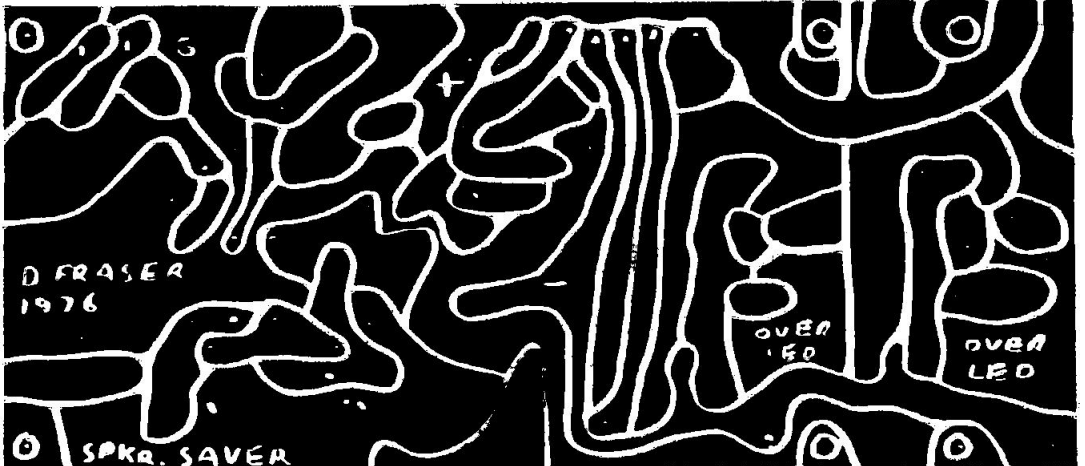
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Fraser Electronics Speaker Saver

It is widely known that when a modern direct coupled (OCL) solid state amplifier is in a fault condition, it usually exhibits a DC offset across the speaker terminals. This condition will first produce a loud hum from the speakers, followed by the destruction of any unprotected speakers. Fuses are used in most amps, but by the time they have blown, the speaker will either be destroyed, or its tonal qualities will be irreversably altered.

A solid state direct coupled amplifier uses two opposing power supplies, with the output transistors used to control that power. With no signal, the transistors are balanced between the two, giving zero volts at the output. To produce the alternating or AC signal which your speaker converts into sound, the transistors unbalance themselves, swinging either towards one supply or the other, never staying one way for more than a fraction of a second This AC signal then pushes the speaker out or pulls in in to produce sound. If a fault occurs, the output will usually latch up to one power supply, causing the balance to be lost. this will either suck in the speaker cone or push it out as far as it can go and leave it there. This can physically damage the cone. Also, for DC the impedance of a speaker is only about a half of its nominal impedance, causing even more damage. As an example, I will use a 100 Watt into 8 ohm amplifier driving a 100 Watt 8 ohm speaker. A 100 Watt amp will use plus and minus 50 volts of power in each power supply, which will cause it to deliver 28.28 RMS volts of AC to the speaker. The formula for power is voltage squared divided by the impedance which in this case is 28.28^2 divided by 8 = 800/8 = 100 Watts. However, during a fault condition the full 50 volts is applied to the speaker as DC when it has a lower impedance. A typical 8 ohm speaker will have a DC impedance of 5 ohms. This gives a power input of $50^2/5 = 2500/5 = 500$ Watts. Very few speakers can take a 500% overload for very long and survive.

One solution is to put something in series with the speaker, which will block DC but pass AC. This device is known as a capacitor. It has one fault in tat it has poor bass response. To get one large enough to have good bass response one would have to use a type known as a non-polarized electrolytic, and these add about 2% distortion to the sound. This lack of bass response, is used in crossover networks to block bass from the mid-range speakers and tweeters to good effect though they do affect damping factor. For bass speakers and for all speakers in systems used in an electronic crossover system, a better solution must be found.

With the FRASER ELECTRONICS SPEAKER SAVER, a relay is placed in the amplifier along with a control circuit for the relay. The relay is connected so that the speakers are normally disconnected from the amp and only when the amp is okay will it energize and connect the speakers to the amp. In normal operation, when the amp is first switched on, a small lamp lights, telling you that the SPEAKER SAVER is checking your amplifier for any fault that may damage your speaker. If the amp is okay, about 7 to 20 seconds later, the relay will energize, connecting the speakers to your amp. This delay has the added benefit thet any turn on thump the amp has will not be passed on to the speakers. If there is any fault with the amp which could damage your speakers, the relay will not energize, saving your speakers from damage. Now, during operation, the SPEAKER SAVER also constantly monitors your amp, and if it blows while operating, the SPEAKERSAVER will disconnect your speakers, preventing costly damage. The SPEAKER SAVER is also set so that when you shut off the amp, the relay drops out immediately, preventing any turn off thump from reaching your speakers.

An additional feature is that the SPEAKER SAVER may prolong the life of your amp. About 15% of the time when an amp blows, it is due to the turn on surge blowing parts that have become marginal with age. The turn on delay of the SPEAKER SAVER reduces the surge for the amplifier which may reduce the the maintenance cost of the amp to you.

Also, as an added bonus, we have incorporated a device called OVERLED in the SPEAKER SAVER. The word OVERLED is a combination of overload and LED which stants for light emitting diode. A LED is a small lamp with very fast turn on and aff times and a very long lifetime. This circuit constantly monitors the output of the amplifies and lights whenever clipping occurs. Clipping is a type of distortion caused when the amp is overdriven and tries to put out more power than it was designed to deliver.

The SPEAKER SAVER is a virtual necessity with today's high powered and very critical professional amps and is useful on higher grade home equipment. Some amps come with this already, such as the Hitachi HA-610, Rotel 1412, and Dynaco 400, and eventually most other manufacturers will add it to their amps. However, today, you can have this important feature added to your amp for less than the cost of one recone kit, or one new woofer. If it saves you one speaker in the lifetime of the amp, it has paid for itself.

Please, however, note that the SPEAKER SAVER will not prevent damage caused by overpowering small speakers.

The SPEAKER SAVER is available now in mono and stereo versions, and may be adapted to a quadrophonic amp. The stereo version comes with 2 OVERLED circuits on the printed circuit board. Prices are available from FRASER ELECTRONICS or from the dealer indicated below, who can also arrange for professional installation into your amplifier or power rack. OVERLEDS are also available seperately.

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