# Audio blanker suppresses radar-pulse and ignition noise

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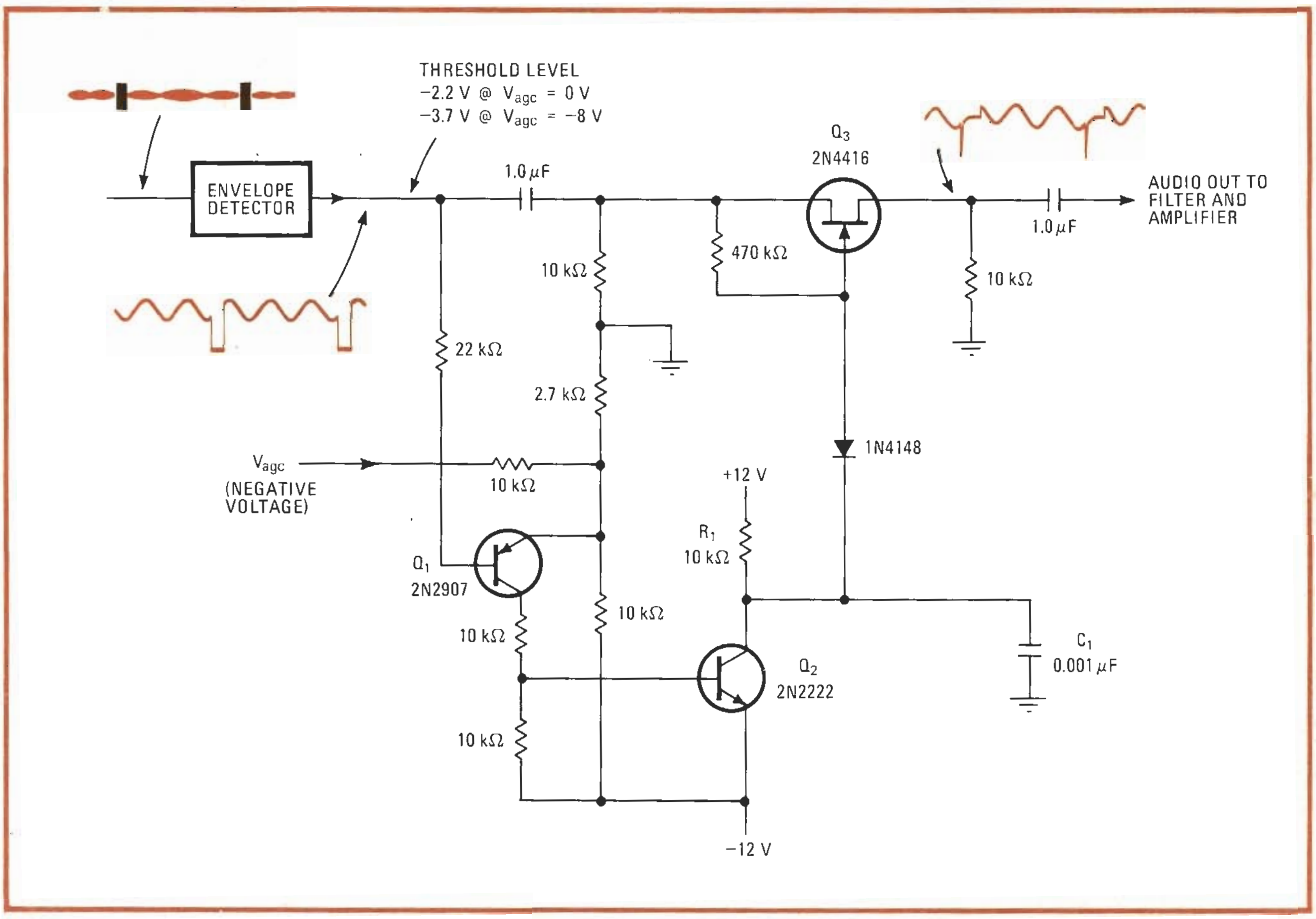
This simple audio-stage noise blanker will reject most repetitious, pulse-type interference, like radar and automobile ignition spikes, that often plagues a-m receivers. The circuit is both less costly and far less complex than the radio-frequency stage blankers employed in some of the more sophisticated receivers, and though not as effective in eliminating interference, it outperforms the more commonly used noise-limiting audio-clipping circuits.

The blanker shown in the figure detects whether the amplitude of an offending pulse train at the output of the receiver's envelope detector exceeds a set threshold and then disables the output stage if necessary. Waveform diagrams are shown at several circuit points to help clarify operation of the blanker.

A typical amplitude-modulated signal might appear at the input of an a-m receiver as shown in the upper left of the figure, where a 20-megahertz radio-frequency wave, modulated 30%, is overridden by radar pulses 20 decibels greater in amplitude. A time-magnified portion of the a-m detector output, after passing through an inverting operational-amplifier stage, would appear as shown, where the maximum amplitude of the pulse would be limited by the saturating level of the intermediate-frequency amplifier. Only two offending pulses are shown for clarity, but this detected signal contains a pulse train of sufficient amplitude and repetition rate to generate a substantial pulse noise and so impair the readability of the signal.

The interfering spikes increase the effective modulation percentage to well over 100%. The blanker is triggered into operation when the modulation peak exceeds 140%, whereupon $Q_1$ and $Q_2$ switch on and disable signal-gate $Q_3$ for the duration of each spike. The 140% threshold has been experimentally determined as the point at which the interference caused by the blanking operation itself is still less than the interference generated by the offending pulse train. Note that to ensure that the blanking action occurs at the set modulation peak independently of signal-level changes, the receiver's automatic-gain-control signal is introduced at the




**Spike eater.** Audio-stage noise blanker, although not as effective at eliminating pulse-type interference as rf-stage blankers, outperforms noise-limiter/clipper circuits. Blanking occurs when spikes raise effective modulation percentage over 140%. Receiver's agc signal is introduced to emitter of $Q_1$ to ensure that the blanking action occurs at the set modulation point independent of input signal amplitude.

threshold bias point at the emitter of $Q_1$.

$Q_3$ operates with no applied dc voltage so that no switching transients will be generated by the blanking action to impair circuit performance. $Q_2$, $R_1$, and $C_1$ have a fast-attack, slow-decay characteristic. $Q_3$ is thus gently turned on after a spike has passed so that the popping and clicking sounds that often accompany the operation of a blanking circuit that processes a randomly occurring train of spikes will be further suppressed.

The results of the blanking action are shown at the output of $Q_3$, where it is seen that only brief transients appear. The signal is slightly distorted, but the distortion is barely audible. There is a great improvement in noise reduction, however. □