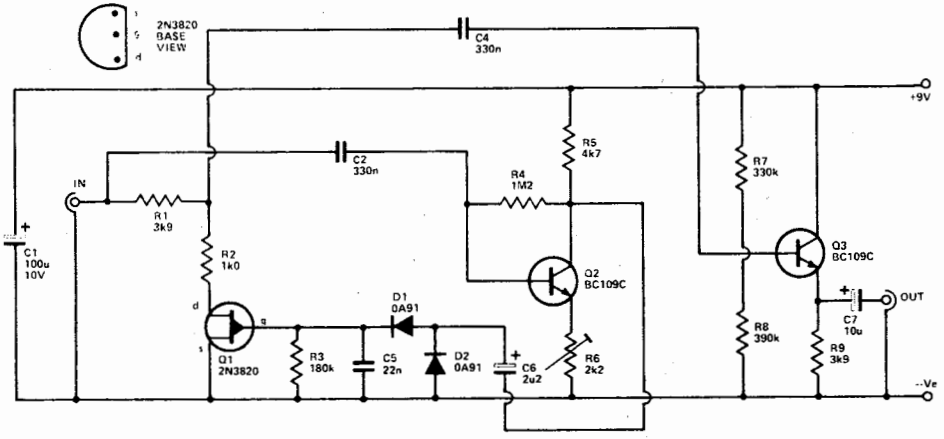
Designer Circuits

NOISE GATE

Noise gates are primarily used in communications equipment, but they could, no doubt, be used in public address equipment and other applications where there is the problem of a high background noise Level. The purpose of a noise gate is simply to reduce the gain of the equipment when there is only a low signal level. Thus, during brief pauses that occur during normal speech the background noise is attenuated, but while the speech signal is present the gain of the equipment is returned to its normal level. The true signal to noise ratio is not actually improved at all, but the monotony of the continuous high noise level is removed, making the signal easier to listen to and aiding intelligibility.



Q1 is an N channel JFET which is used here as a voltage controlled resistance. Under quiescent conditions Q1 gate is biased to the negative supply rail by R3, and this switches the device hard on so that it exhibits a low resistance of only about 100 ohms. The input signal is applied to an attenuator which has R1 as the series element, and R2 plus the drain to source resistance of Q1 as its shunt element. With Q1 switched on there is a loss of about 11dB through the attenuator.

Some of the input signal is amplified by a common emitter amplifier based on Q2, and then fed to a rectifying and smoothing circuit which is comprised of D1, D2, and C5. If the input signal is of sufficient strength this produces a strong enough positive bias to switch off Q1, causing its drain to source resistance to increase to many megohms. There is then very little attenuation of the signal. pauses that occur during normal Thus, low signal levels (noise only) are reduced while high signal levels (noise and wanted signal) are allowed to pass virtually unaffected. The attenuator must feed into a fairly high impedance or the action of the circuit will be impeded. An emitter follower buffer stage based on Q3 is therefore interposed between the attenuator and the output. The time constant of the circuit has been made quite short so that there is a quick response to changes in signal level.

The circuit will operate with an input level of between about 50 mV and 2 V. RMS. R6 is adjusted for virtually the lowest resistance that does not cause the background noise to activate the unit.