

Tuning-meter muting improves receiver's squelch response

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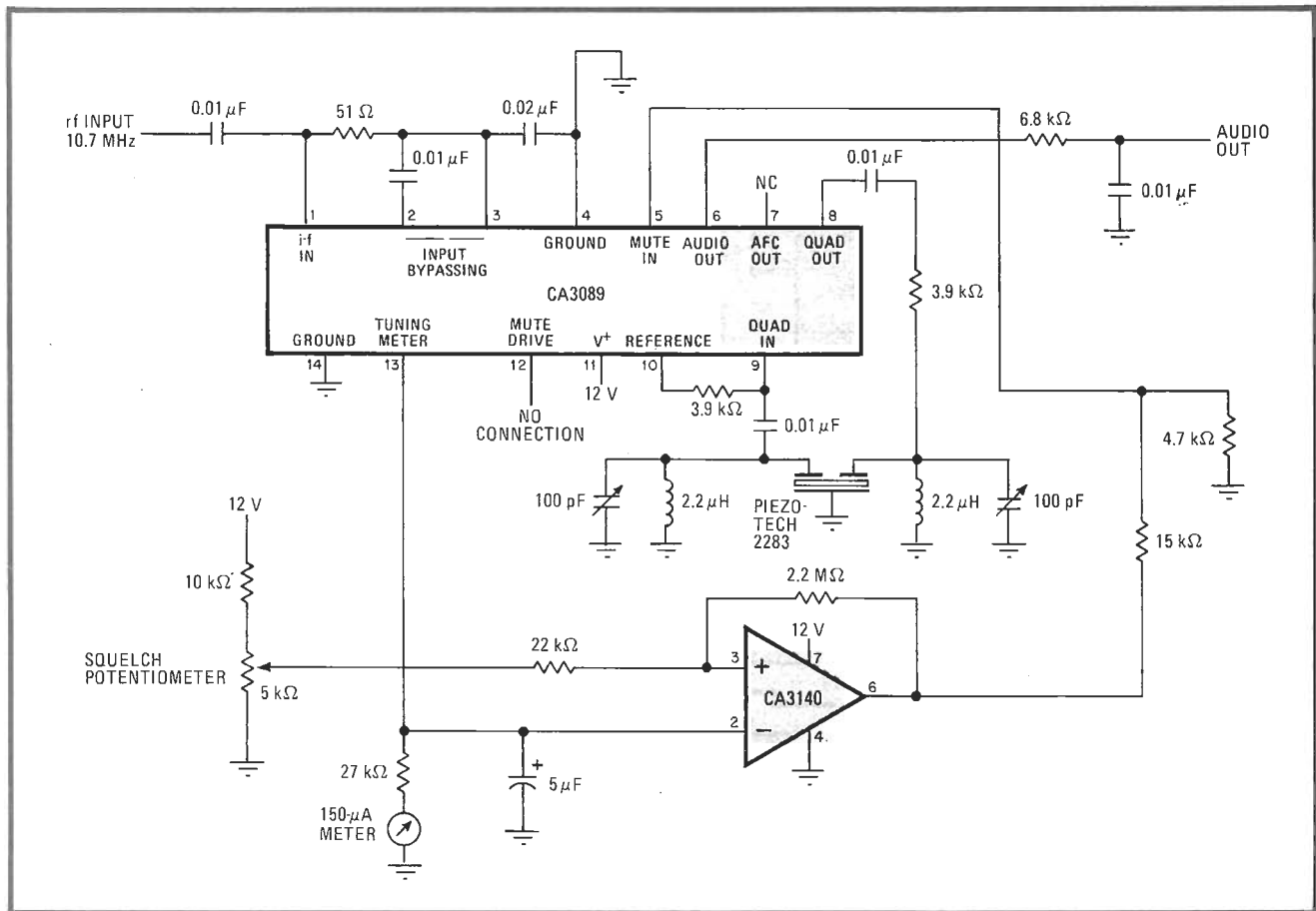
Although the CA3089 FM/IF system offers the advantages of one-chip simplicity, good limiting capability, high gain, and excellent linearity when used in wideband fm-broadcast receivers,¹ its audio-channel muting performance, and thus its squelch response, suffer in narrow-band applications, especially at low signal levels. Utilizing the output voltage from the device's tuning-meter port to drive the audio-muting control circuit through an operational amplifier greatly improves squelching, particularly for signals whose amplitudes are barely detectable.

The circuit configuration of a typical limiter-discriminator designed for a modulation deviation of ± 5 kilo-

hertz is shown in the figure. As in many discriminators, a crystal serves for the high-Q tuned circuit and so makes possible the high audio recovery required in a narrow-band configuration.

The internal muting action of the CA3089, though sufficient for wideband service, lacks the speed and precision necessary for narrowband operation, because the system's effectiveness is a function of the characteristics of the detector's frequency-determining elements connected to pins 8, 9, and 10, as well as the gain distribution of the entire receiver. Narrowband receivers usually make full use of the system's available sensitivity by having as much gain as possible before the detector so that limiting occurs on noise, and the small-bandwidth characteristics of the CA3089 circuit are similar. At low signal levels, this limiting causes the squelch circuit to be almost useless. In some of the recommended circuits for frequency discriminators, the squelch circuit will not operate at all.

Driving the mute-control amplifier from the tuning-meter port (pin 13) instead ensures that the tuned circuit and the chip's gain distribution have no effect on squelch



Silence. Circuit derives voltage for squelch-control amplifier from CA3089's tuning-meter port, whose output is linear over 5 to 10,000 μ V. Op amp provides gain for surefire operation. Configuration provides positive squelch response, even at low signal levels, by bypassing the combined nonlinear response of tuned circuit and mute-drive circuit internal to the CA3089.

operation. The meter-output voltage, taken from the unit's three intermediate-frequency amplifiers and their level detectors, has a constant characteristic—that is, it is independent of the tuned circuit used. In fact, the response is virtually linear for input signals ranging from 5 to 10,000 microvolts.

The high input impedance of the low-noise CA3140 op-amp comparator will not load down pin 13, and its gain enables the squelch circuit to operate in a surefire manner. The CA3140 is used as a comparator with a variable threshold set by the squelch potentiometer, as

shown. A voltage divider at its output ensures that no more than about 5 volts can be applied to port 5—anything higher would cause latchup in the CA3089, which might cause excessive power dissipation.

The CA3140 can operate with a common-mode voltage equal to that of the negative supply, and it may therefore be operated from the same power source as the CA3089. □

References

1. J. Brian Dance, "One-chip for demodulator has improved response," *Electronics*, Dec. 22, 1977, p. 78.
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