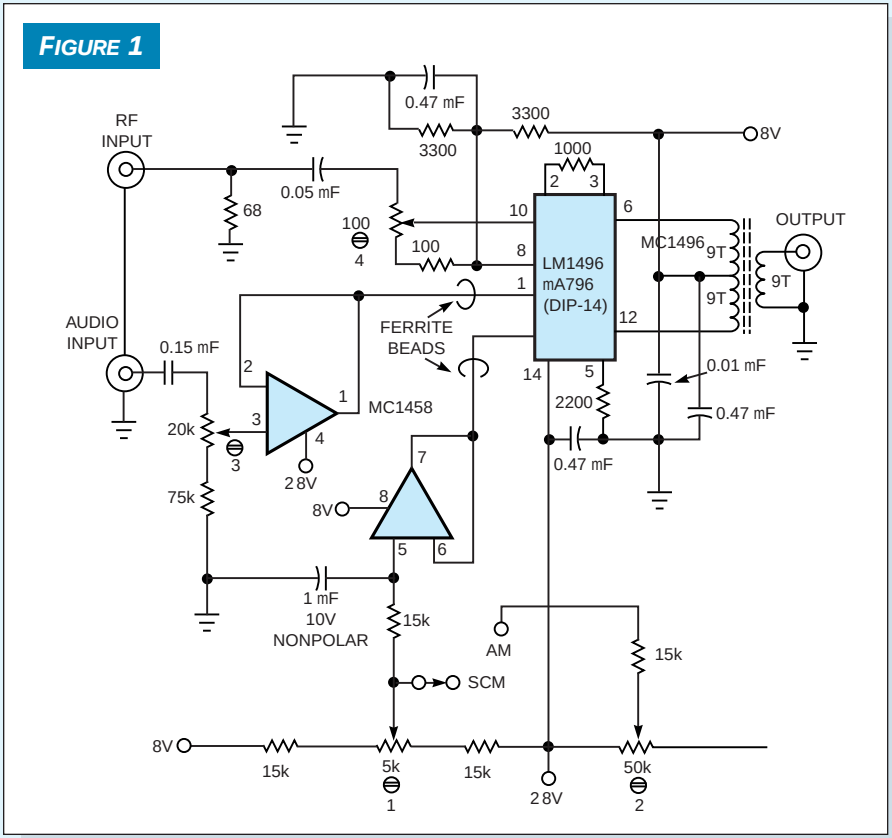
Add-on modulator has high bandwidth

MJ SALVATI, FLUSHING COMMUNICATIONS, FLUSHING, NY

The simple circuit in **Figure 1** is an add-on modulator that converts the output of a continuous-wave (CW) source to either an amplitude-modulation (AM) or a suppressed-carrier-modulation (SCM) format. Because the circuit has unity gain and 50V input and output impedances, the CW generator's output-level indications remain valid. The frequency response is flat from 0.3 to 45 MHz and only 0.1 dB down at 0.1 and 60 MHz. The modulation bandwidth is similarly broad: flat to 50 kHz and 3 dB down at 15 Hz with the capacitive coupling shown in **Figure 1**. Modulation levels to 100% are possible. Because the modulation sensitivity is 10% per 100 mV rms of modulating signal, you can read the modulation level directly from the audio generator's output-level indicator.

FIGURE 1



A few trimpots, a toroidal transformer, and a dual op-amp interface with a modulator IC to form a linear, high-bandwidth AM modulator.

The circuit is a variation of a standard LM1496/1596 amplitude-modulator setup. It differs from the standard in that it uses a toroidal transformer to provide impedance matching and maximally efficient drive for a low-impedance load, and it drives the modulation ports through unity-gain op amps. The op amp driving Pin 1 provides a high input impedance; thus, it lessens the demands on the audio source and allows practical values for the coupling capacitor. If the audio signal source has no dc component, you can omit the coupling capacitor. You can wind the toroidal transformer with 24-gauge telephone wire over a ferrite core taken from a Sony (www.sony.com) 1-421-302 line choke. A Ferronics (www.ferronics.com) 11-261-J or JW Miller (www.bellind.com) F-50-1 core work equally well. **Figure 1** indicates the adjustment order for the four trim pots. Initially, set all pots to midpoint and inject a 50-mV rms carrier into the RF-input connector. Set the modulation-code switch to SCM and adjust the 5-kV pot for exactly 0V dc at Pin 5 of the MC1458. Next, connect an audio signal to the audio-input connector and switch the modulation mode to AM. Adjust both the 50-kV pot and the audio-signal level until you achieve 100% modulation with no peak clipping and no trough overshoot. Once the biasing is set, set the audio generator's output to exactly 500 mV rms then adjust the 20-kV pot for exactly 50% modulation. Last, set the RF input at exactly 50 mV rms and adjust the 100V pot for 50-mV rms output into a 50V load. (DI #2245) e

To Vote For This Design, Circle No. 380