6.9 SUBTRACTIVE INSTRUMENTS THAT USE PERIODIC SOURCES

The effect of filtering a periodic source is very different from that of filtering a noise source. Because periodic sources are pitched, the center frequency and bandwidth settings have no significant effect on pitch perception. Instead, these frequency settings affect only the timbre. Figure 6.23 shows a simple filter instrument connected to a periodic source. The center frequency and bandwidth are usually set greater than the frequency of the highest pitch to be played by the instrument. The settings are not changed with pitch. This arrangement places a fixed resonance, called a formant, in the spectrum of the sound at the center frequency of the filter. A spectral component that falls near the resonance will be emphasized because it will be attenuated less than those farther away from the resonance. The presence of fixed resonances in the spectrum is thought to contribute to our perception of timbral homogeneity. (See section 2.6.) Figure 6.24 shows a formant imparted to the spectra of tones at 250 and 450 Hz by a resonance peak at 1000 Hz. The resonance peak will emphasize the fourth harmonic of the 250-Hz tone, but will emphasize the second harmonic of the 450-Hz tone. The tones will share a timbral similarity because of the common resonance structure.

A subtractive-synthesis technique frequently used in electronic music synthesis to create musical tones from periodic sources is called harmonic enveloping. In this tech-

FIGURE 6.22 Instrument for producing glissandoing noise bands.

FIGURE 6.23 Filtering a periodic source.

FIGURE 6.24 Two spectra with different fundamental frequencies that display the same formant.