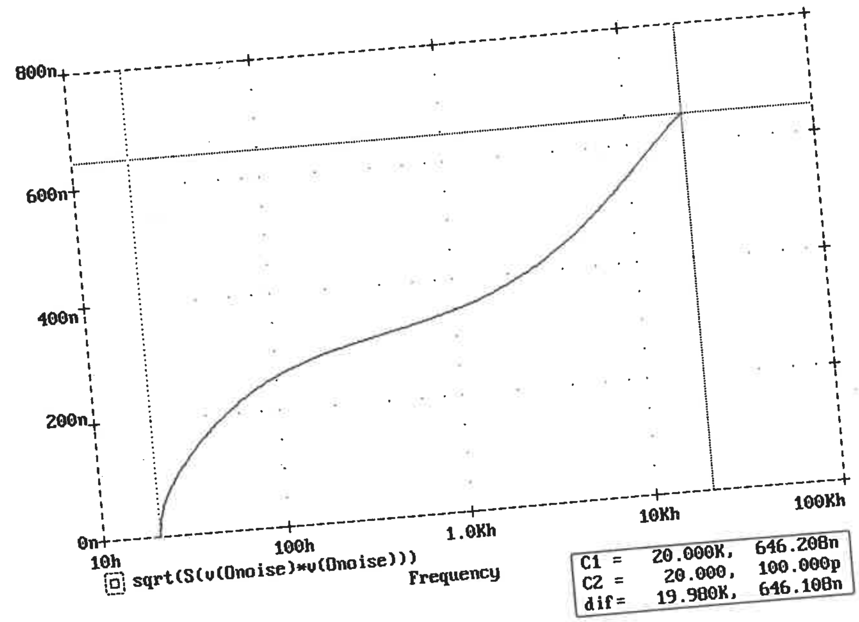

FIGURE 10-4 Plot of total output noise.

across the band. The total noise is the y-value of cursor "C1," in this case 646.2nV. Although the greatest noise values occurred at low frequencies, we can see that the higher frequencies made up for this by having more bandwidth! Even so, nearly one-half of the total noise comes from the 20-to-200 Hertz band.

Now that we can calculate total noise, calculating *signal-to-noise* (S/N) is similar, since

$$S/N = 20 \cdot log\left(\frac{\text{signal}}{\text{total noise}}\right) \tag{10-3}$$

That is, the value for S/N is the ratio of signal power to noise power expressed in decibels. Given that our magnetic phono-cartridge, in this example, generated an average signal (after de-emphasis) of 4mV, we may now display the graph for S/N. If you do this often, you might consider creating a Probe macro for S/N; for example:

```
SN(signal) = ((signal)/sqrt(s(v(onoise)*v(onoise))))
```

This was done for the plot in Figure 10-5, which shows the running result for S/N, starting at 20 Hertz. We can see that for the entire audio range, the limiting signal-to-noise ratio to expect from an ideal pre-amplifier is under 80dB.