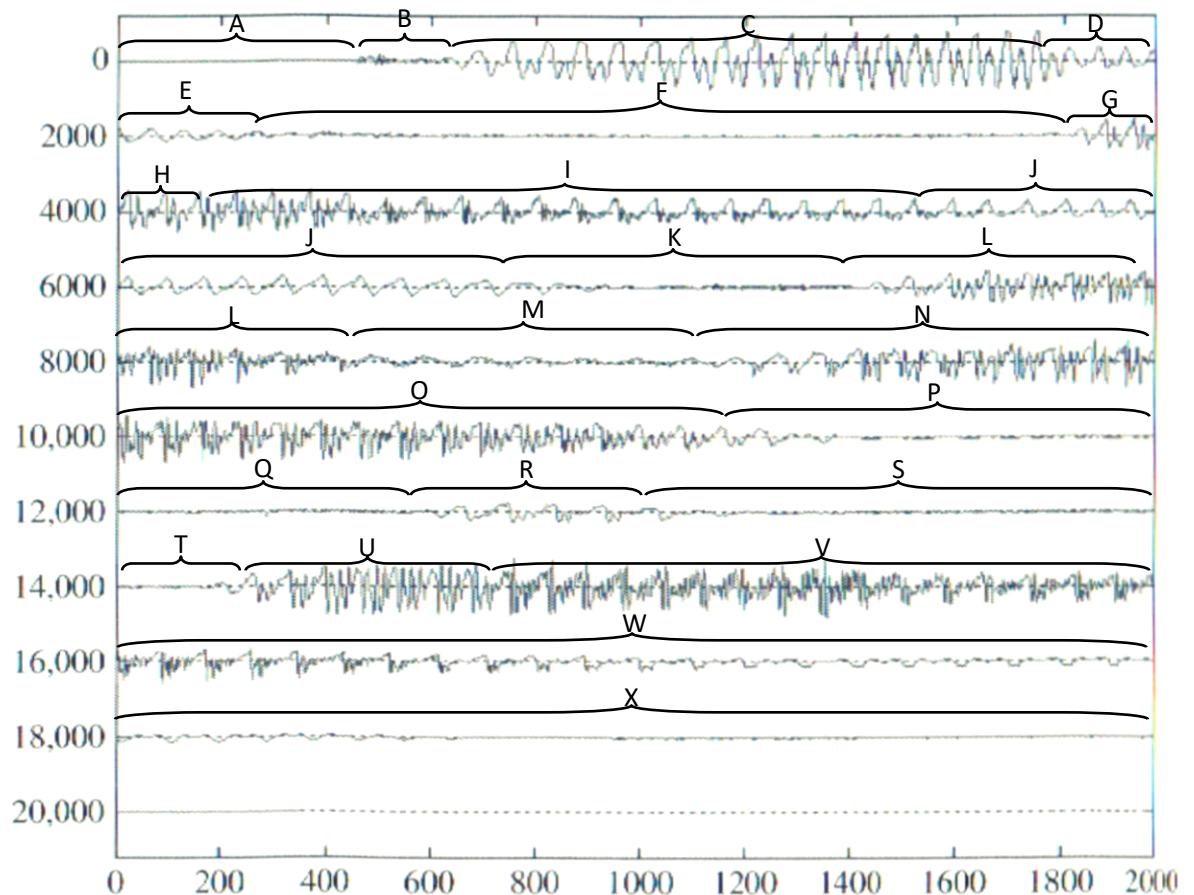1. Segment the waveform in Figure P3.6 into regions of voiced speech (V), regions of unvoiced speech (U), and regions of silence (or background signal) (S). The waveform corresponds to the sentence "Good friend are hard to find."

   What you need to do is to assign a label of V, U, or S to each of the speech segments from A to X.

FIGURE P3.6
Waveform for the sentence "Good friends are hard to find."

2. Figure P3.9 shows two spectrograms of the utterance "Cats and dogs each hate the other."

   The sampling rate of the utterance is $F_s = 8000 samples / \sec$

   The phonetic representation of the text of this sentence is:

   /K AE T S – AE N D – D AO G Z – IY CH – HH EH T

   – DH IY – AH DH ER/

(a) Which spectrogram is a wideband spectrogram ?

(b) Using the appropriate spectrogram, estimate the fundamental frequency at t=0.18sec.

(c) Is the fundamental frequency increasing, decreasing, or remaining fairly constant in the time interval between 1.6 and 1.8sec ?

(d) Estimate the first three formant frequencies at time t=0.18sec.

(e) In this utterance, the /D/'s in "and" and "dogs" merge. Tell me the starting time of the merged /D/ in both spectrograms of Figure P2.
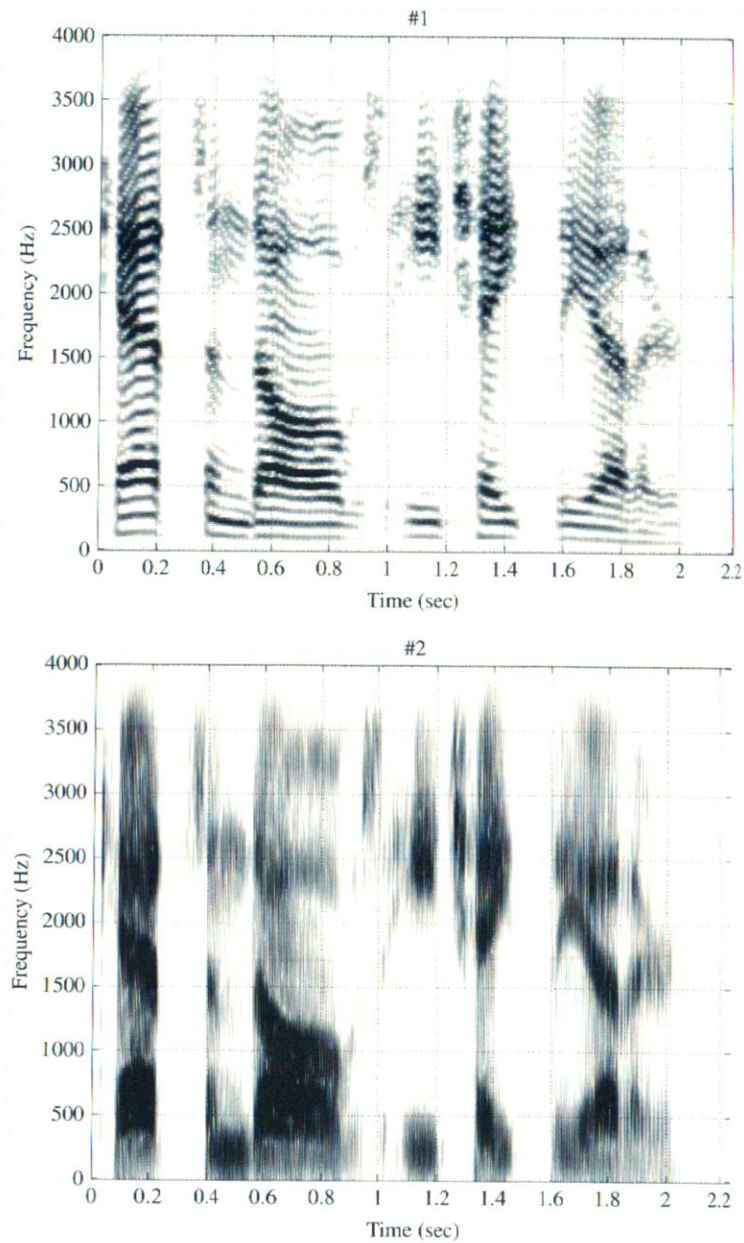
FIGURE P3.9
Spectrograms of utterance of "Cats and dogs each hate the other."