Columbia University   **EE E4896 Music Signal Processing**
Department of Electrical Engineering   **Spring 2005**

Homework 4
– Due May 2, 2005 –

Problem 1
Explain in detail the operation of the dynamic filter of Figure 5.7 (p. 98) in the DAFX book.
Include a derivation of the transfer function of the system for the different operating modes.
Explain how it fits in the overall side chain processing path. How will this system behave when
the original side chain input signal never exceeds the associated threshold?

Problem 2
Here we will use the design for a peaking filter that uses a second-order all-pass filter, as
described in Section 2.3.2 of the DAFX book. First, give an intuitive interpretation of eq. 2.54 –
why does this equation result into a peaking filter? Then, using the implementation suggested in
Fig. 2.22 or your own, write MATLAB code that implements the filter. Your code should accept
as inputs the desired gain G (increase or decrease), the center frequency f_c and the desired
bandwidth f_b. Plot the frequency response for three different gain factors and their negatives;
then fix the gain and produce plots for three different bandwidths (thus duplicating Fig. 2.23).