Signal Flow Graphs and Transposed Realizations
Signal Flow Graphs

Direct Form II
Block Diagram

Direct Form II
Signal Flow Graph
Both branch points and summing junctions are indicated by nodes. Each signal leaving a node is the sum of the signals entering the node. The input signal comes from a source node and the output signal goes to a sink node. A theorem from signal flow graph theory says that if we reverse the direction of all branches and exchange the input and output nodes, the system’s transfer function remains the same.
Signal Flow Graphs

Reversed Direct Form II Flow Graph

\[ Y(z) \rightarrow \frac{1}{a_0} \rightarrow b_0 \rightarrow X(z) \]

\[ \rightarrow -a_1 \rightarrow \frac{1}{z} \rightarrow b_1 \]

\[ \rightarrow -a_2 \rightarrow \frac{1}{z} \rightarrow b_2 \]
Signal Flow Graphs

Transposed Direct Form II Block Diagram

\[ Y(z) \leftarrow \frac{1}{a_0} + b_0 \]

\[ + \]

\[ \frac{1}{z} \]

\[ a_1 - + b_1 \]

\[ + \]

\[ \frac{1}{z} \]

\[ a_2 - + b_2 \]

\[ + \]

\[ X(z) \]