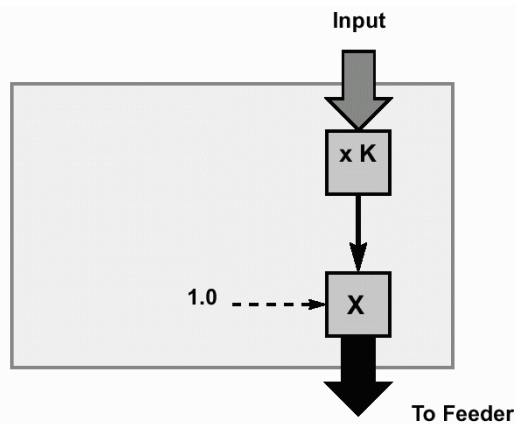


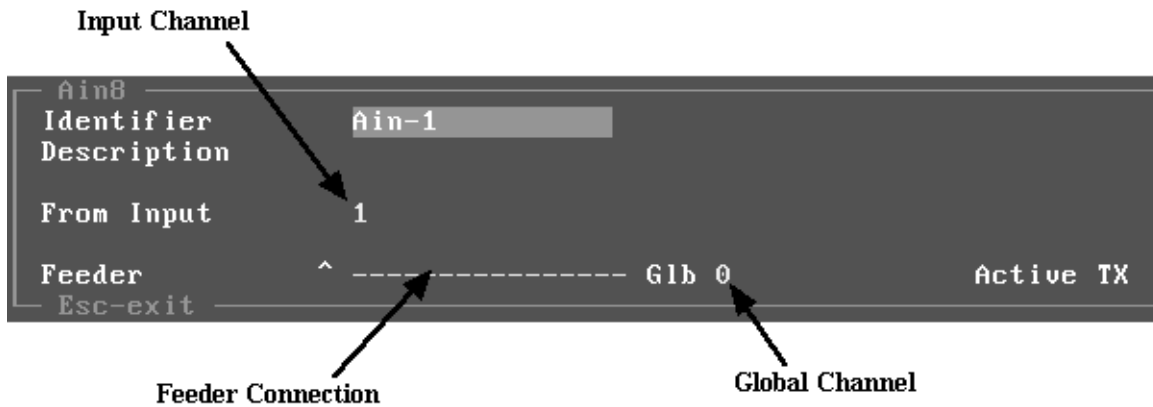
Advanced Signals

Audio Input



Brings an audio input channel in as a signal which can be mixed, filtered, or added into any combination of highway channels via a feeder connection.

Note: This object replaces the analog input objects of earlier revisions of Model Builder, since all three analog input feeders can be replaced by this one object used in conjunction with either a balancer, or a signal mixer.



Input Channel

Input channel on waveform synthesizer or input highway from “RIU_Input” feeder object.

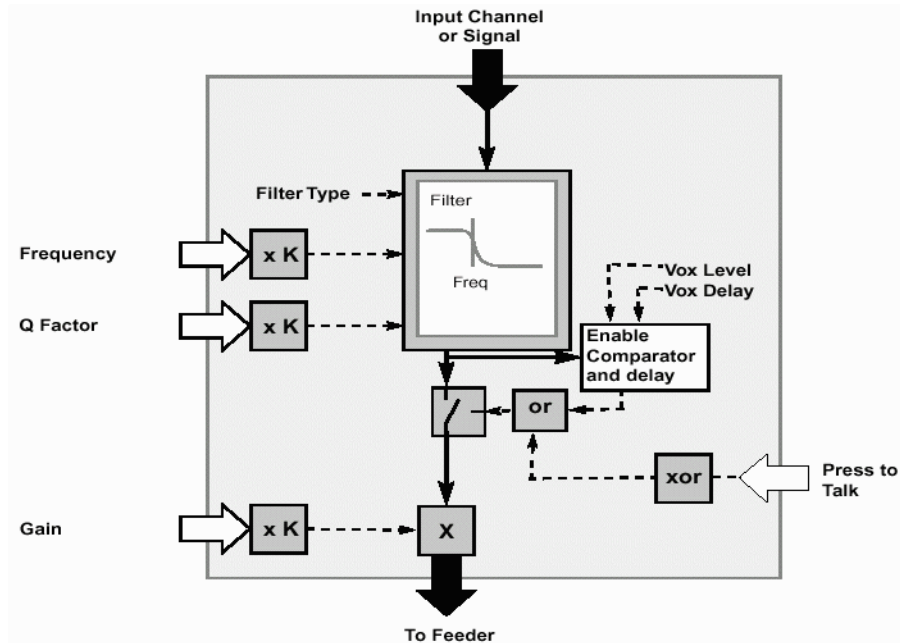
Feeder Connection

Connection to a feeder, which adds the analog input into the signal highway.

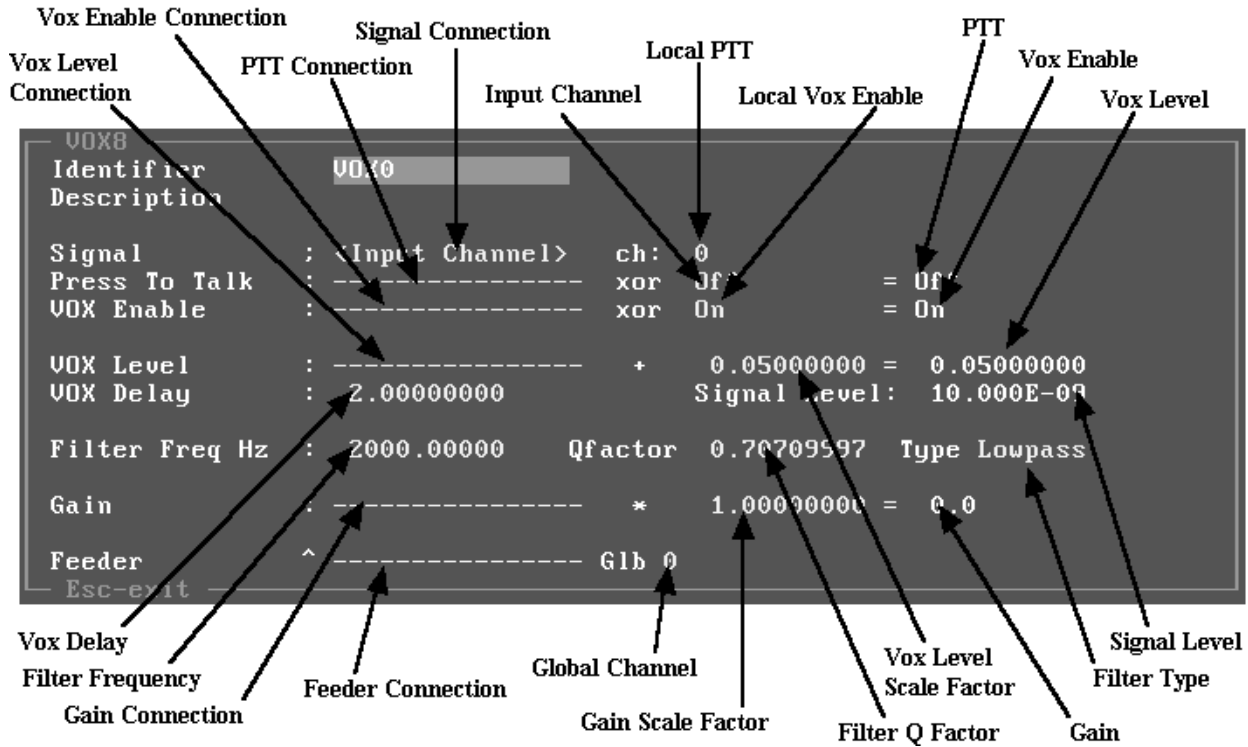
Global Channel

Connection to a Global Channel. If this field is non-zero, the same sound that gets sent to the feeder connection will be sent to the global channel, where it can be picked up by other models running on other DSP boards. See the section on Global Channels for details

VOX



The VOX object allows VOX or push to talk control over an input channel or a signal. If the filtered input sound level exceeds the VOX level, the VOX comparator will turn on. Once the input signal level has dropped below the VOX threshold, the VOX object will remain ON for the period of time specified by the VOX delay.



Input Channel¹

Analog input channel on waveform synthesizer or TDM input picked up by an RIU. This should be set to zero if the input is taken from the Signal Connection.

Signal Connection

Connection to an input signal. If this field is not empty, then the input channel should be set to zero.

Gain Connection

Control object connection to provide amplitude gain control from elsewhere in model.

Gain Scale Factor

Scaling factor for gain control value.

Gain

Amplitude gain of the output signal. If the gain connection is blank then the gain scale factor is used as the gain value; otherwise the gain is the scale factor times the output result of the control object.

PTT Connection

Connection to a control object that provides a Press to Talk value.

Local PTT

Provides a local Exclusive Or value for the Press to Talk Connection.

1. In MB 4.06 and later, if the channel number is negative (-), the VOX object picks up the audio on the corresponding highway. This can be used to pick up both what is said and heard for operator communications panels. The audio is typically sent to an observer station or recorded for After Action Review (AAR).

PTT

If the Press To Talk is ON, then the input signal will be passed to the output.

Signal Level

Indicates the sound level of the input signal. 0.03-0.07 is a good idle signal level while 0.3-0.7 is a good active signal level. If the level shows 10.000E-09 then there is no signal available on that channel or the incoming signal has been deactivated.

VOX Level Connection

Provides a connection to a control object which allows the host computer to control the VOX level.

VOX Level Scale Factor

Provides an offset value for the VOX level Connection. If the VOX Level Connection Field is empty, then this becomes the VOX Level.

VOX Level

If the VOX enable is on, then the Signal Level is compared to the VOX Level. If the signal level is higher, it enables the input to be fed through for a period of time equal to the VOX Delay. If the signal level exceeds the VOX level while the timer is on, it will reset the timer. (i.e. If the input signal exceeds the VOX level at least once every delay time, the input signal will be continually fed through.)

VOX Delay

The amount of time after the Signal Level falls below the VOX level that the input signal will continue to be fed through.

Filter Type

Type of filter the input signal will be filtered by. The filtering occurs before the VOX compares the signal level to the VOX Level. If no filtering is desired, the filter type should be set to AllPass.

Filter Frequency

Provides the characteristic frequency of the filter.

Filter Q Factor

Provides the Q factor for the filter.

VOX Enable Connection

Connection to a control object that allows host control over the VOX Enable.

Local VOX Enable

Provides an exclusive or value for the VOX enable connection. If the VOX Enable Connection is empty, it provides the value for the VOX Enable.

VOX Enable

If the VOX enable is on, the VOX comparator (whose action is described in VOX Level) can enable the feeding through of the signal. If it is off, the signal can only be fed through by the Press to Talk.

Feeder Connection

Connection to a feeder, which adds the output into the signal highway.

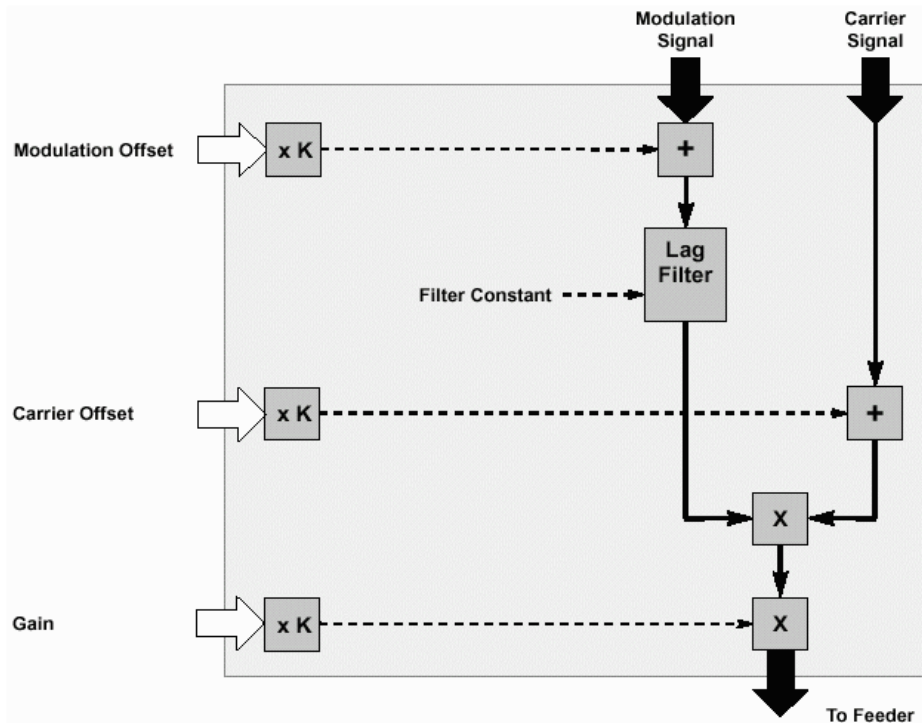
Global Channel

Connection to a Global Channel. If this field is non-zero, the same sound that gets sent to the feeder connection will be sent to the global channel, where it can be picked up by other models running on other DSP boards. See the section on Global Channels for details.

Global In

For information on the Global In signal, see the section on global channels.

Amplitude Modulator



The amplitude modulator provides a signal multiplication capability between two signals, a carrier waveform and a modulating envelope. This is useful for general warning tones (e.g. Radar Warning Receivers). Complex warning tones can be generated when the amplitude modulator is used with one of the pulse signals described later.

The modulation signal can be offset from zero to allow for control of the modulation depth. A lag filter is also provided to soften the edges which occur when square wave modulating a sine wave. The filter constant determines the effective slew rate of the modulating signal.

The filter function is defined as:

$$Y_N = Y_{N-1} + K(X_N - Y_{N-1})$$

Where

X_N = new input value

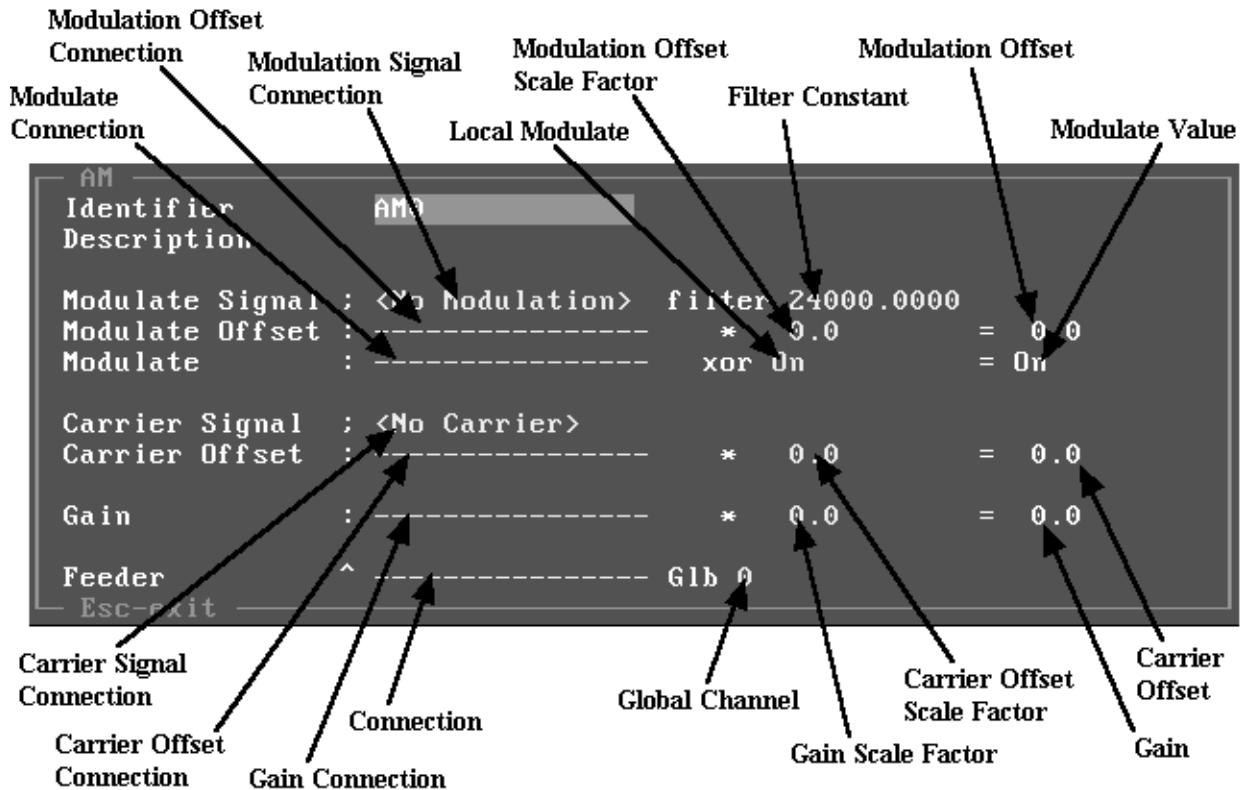
Y_N = new output value

Y_{N-1} = last frame's output value

K = filter constant

where:

$$K = \pi \times (\text{FilterFreq} / \text{SampleRate})$$



Modulation Signal Connection

Connection to the modulating signal.

Filter Constant

Value for modulation signal lag filter, roll-off frequency (in Hertz).

Modulation Offset Connection

Connection to a control for the offset to be added to the modulation signal.

Modulation Offset Scale Factor

Scaling factor for modulation offset.

Modulation Offset

Value added to modulation signal prior to multiplication by carrier signal. If the offset connection is blank then the offset scale factor is used; otherwise the offset is the scale factor times the output result of the control object.

The modulation offset should be 1.0 to provide a full depth of modulation from a square or sinusoidal source. This assumes the gain of the originating signal is set to 1.0, in which case it will swing between -1.0 and 1.0, hence the need for a 1.0 offset.

If a pulse stream is used then this offset should be set to 0.0 for an on/off modulation of the carrier.

Modulate Connection

Connection to a control for the modulation state.

Local Modulate

Local state for modulation.

Modulate Value

Modulate control, when On carrier is modulated; otherwise, the carrier passes through with no modulation. If the modulate connection is used then the modulate value is the exclusive-or of the connected control value and the local modulate flag.

Carrier Signal Connection

Connection to the carrier signal to be used by the modulator.

Carrier Offset Connection

Connection to a control for the carrier offset to be added to the carrier signal.

Carrier Offset Scale Factor

Scaling factor for carrier offset.

Carrier Offset

Value added to carrier signal prior to multiplication by modulation signal. If the offset connection is blank then the offset scale factor is used as the value; otherwise the offset is the scale factor times the output result of the control object.

The carrier offset can be used to effectively mix a proportion of the modulation signal with the modulated carrier.

Gain Connection

Control object connection to provide amplitude gain control from elsewhere in model.

Gain Scale Factor

Scaling factor for gain control value.

Gain

Amplitude gain of amplitude modulated source. If the gain connection is blank then the gain scale factor is used as the gain value; otherwise the gain is the scale factor times the output result of the control object.

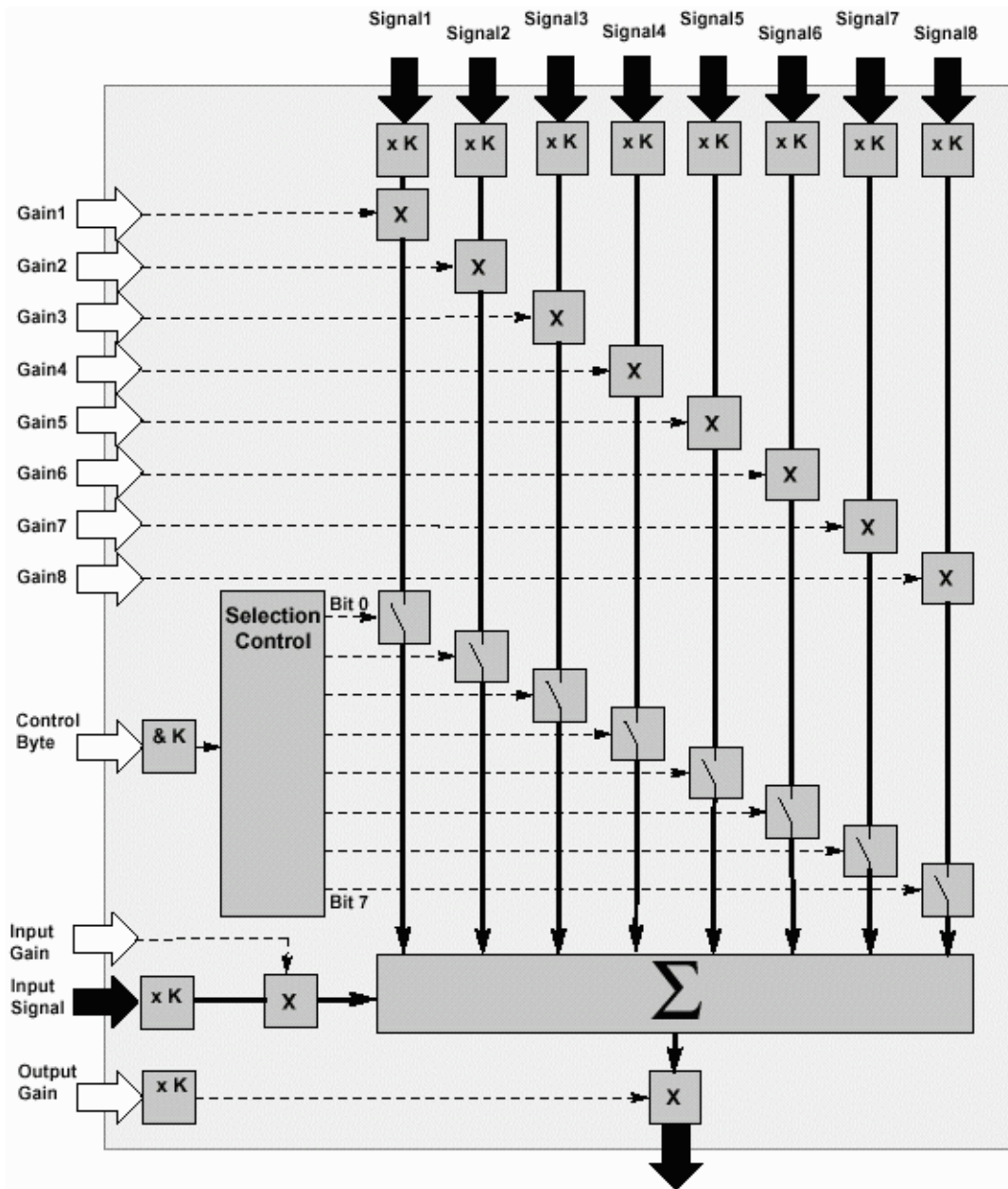
Feeder Connection

Connection to a feeder, which adds the modulated wave into the signal highway.

Global Channel

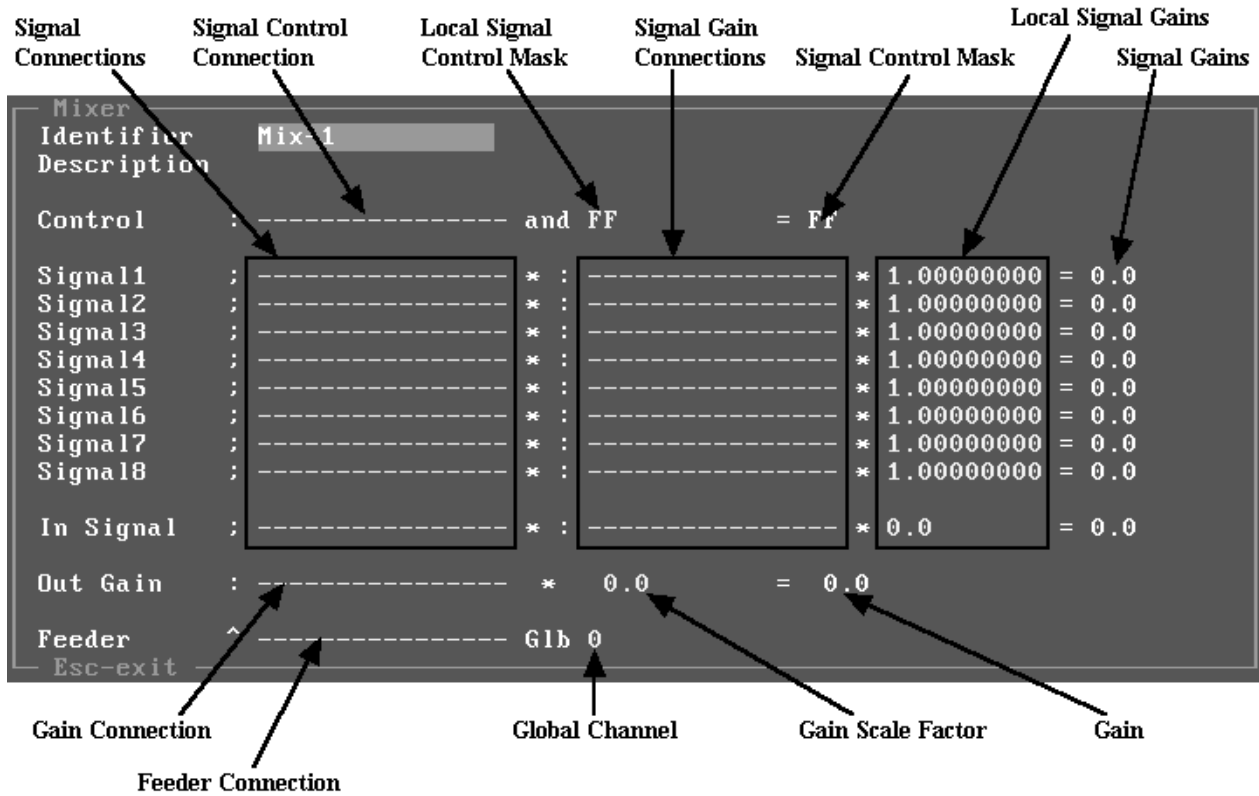
Connection to a Global Channel. If this field is non-zero, the same sound that gets sent to the feeder connection will be sent to the global channel, where it can be picked up by other models running on other DSP boards. See the section on Global Channels for details.

Signal Mixer



The signal mixer provides a controlled mixing of up to eight signals into a single signal. Control is provided over which of the eight signals should be mixed, with both individual signal and overall gain control. If more than 8 signals need to be mixed together simply cascade the mixers by making the “Input Signal” another mixer.

Note: When connecting the output of the signal mixer to any other signal object (e.g. Filter, Frequency or Amplitude Modulator) the input signals should be restricted to the basic signal sets. The complex signals that are in the Radios, Nav-Aids and Intercom packages will not always be mixed into this signal output correctly, but will be mixed into the signal highway correctly. This is a result of the radio and intercom matching being performed at the highway interface and not within this mixer object.



Signal Connections

Signal connection from the signal list, for the eight signals which are mixed into a composite output by the selector. There is also a ninth signal, the In Signal, which is mixed into the output independent of the Control Mask.

Local Signal Gains

Local gain control for each signal.

Signal Gains

Overall gain for each signal, taking into account each signal's control bit (on or off).

Signal Control Connection

Connection to control section of model for switching signals on or off. If connected to a boolean all the signal will be switched together. If connected to an integer, the least significant byte provides a bit mask for each signal, with the l.s.b. controlling signal1 and the m.s.b. signal8.

Local Signal Control Mask

Local control mask for the eight signals. When a connection is present the local mask acts as a bit enable which is the and of the local mask and the connection value.

Signal Control Mask

Individual signal control byte. Each bit enables on of the eight signals. When the l.s.b. is 1 the signal is added to the group. The remaining signals are controlled by each bit in sequence, with the m.s.b. being the control for signal8.

In Signal Connection

Provides a signal connection field that can be summed with the output of the mixer and is intended to allow mixers to be chained together to provide greater than 8 wide mixing to be possible.

Gain Connection

Control object connection to provide amplitude gain control from elsewhere in model.

Gain Scale Factor

Scaling factor for gain control value.

Gain

If the gain connection is blank then the gain scale factor is used as the gain value; otherwise the gain is the scale factor times the output result of the control object.

Feeder Connection

Connection to a feeder, which adds the total signal sound source into the signal highway.

Global Channel

Connection to a Global Channel. If this field is non-zero, the same sound that gets sent to the feeder connection will be sent to the global channel, where it can be picked up by other models running on other DSP boards. See the section on Global Channels for details.

