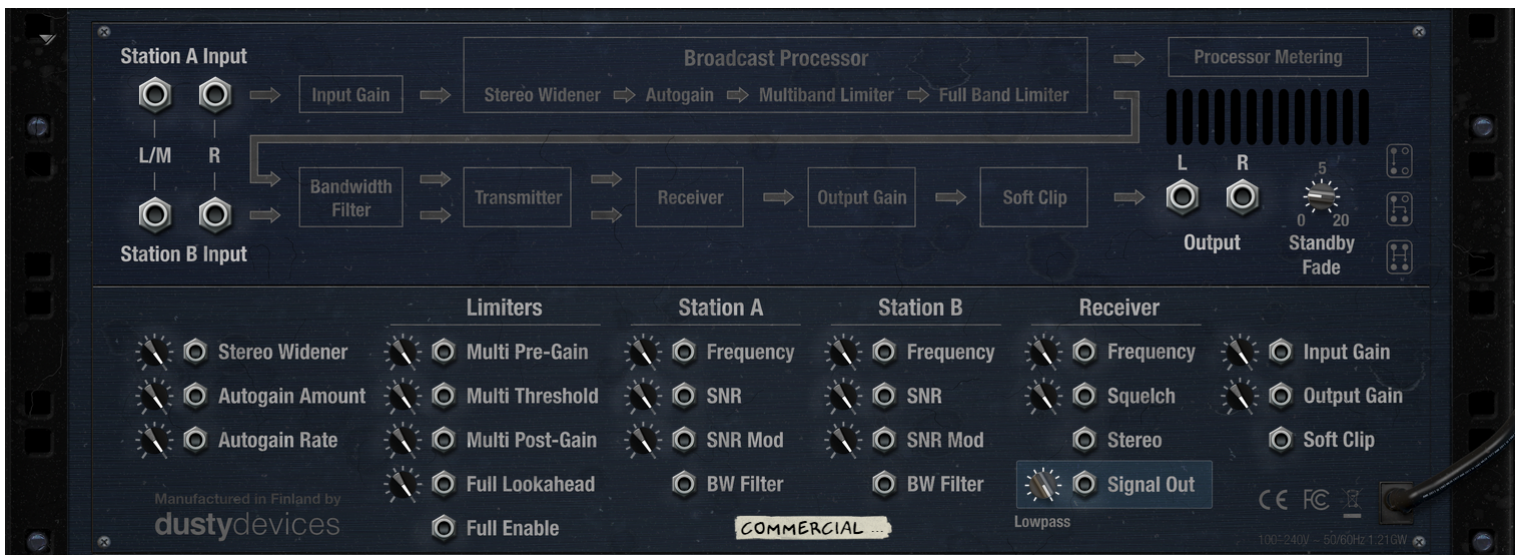


# Radiation

## Rack Extension User Manual



dustydevices

# Introduction

Radiation is a Rack Extension effect device by Dusty Devices which simulates the sound of an FM radio. Radiation provides a simple yet powerful broadcast processor for shaping the audio signal, and transmitters for two stereo signal pairs that are frequency modulated at their own carrier frequencies, and a receiver which demodulates the chosen frequency back into audio.

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## Front Panel

### **Bypass/On/Off**

Standard Reason feature. Bypass lets the signal through without applying any processing, On is the normal processing mode, Off doesn't process the signal and silences the outputs.

### **Patches**

Standard Reason interface for loading and saving patches.

### **Level Meter**

Main level meter in the upper right corner. Displays the signal peak level in dBFS.

Located to the right of the level meter is a switch which cycles the Level Meter display between the Input signal peak level, the Output signal peak level, or display off, in case you are easily distracted by pretty flashing lights.

### **Processor Metering**

Displays the amount of processing applied by the different stages in the Broadcast Processor in decibels. Side Boost, Autogain and Multiband Limiter have LEDs for each of their frequency bands. Full Band Limiter, Pre Levels and Post Levels have stereo LEDs. The metering can be turned on and off with the toggle button on the right side of the Processor Metering title bar. The four singular LEDs at the bottom indicate whether a given processing stage is currently active.

Pre Levels displays the signal level in dBFS after Input Gain and before the Broadcast Processor. Post Levels displays the signal level in dBFS after the Broadcast Processor.

## **Broadcast Processor**

Multi-stage signal processor used to enhance the clarity of the signal before transmitting and receiving. The processor includes a stereo widener, an automatic gain leveler, a multiband limiter, and a full band limiter with lookahead. All the processors can be toggled on and off at once with the toggle button on the right side of the Broadcast Processor title bar.

### **Stereo**

A 5-band adaptive stereo widener. Splits the signal into five separate frequency bands and boosts the side channels without causing phase cancellation if summed down to mono. The stereo widener automatically applies less boost to lower frequency bands to keep the bass frequencies tighter and punchier. The strength can be adjusted with the Widen knob. Stereo widening is disabled when it is set to Off.

The metering displays the amount of boost applied to each frequency band of the side channel.

### **Autogain**

A dual-stage adaptive autogain leveler. Autogain keeps the signal level more consistent by boosting quiet signals and attenuating loud signals. Autogain applies a stereo full-band gain stage, which is then fed into a stereo 5-band parallel compressor. The Amount knob controls the strength of the autogain, and the Rate knob controls both the attack and release. When Amount is set to Off, Autogain processing is disabled.

### **Multiband Limiter**

A stereo 5-band limiter with pre-gain and post-gain. The Threshold controls the approximate level at which each frequency band limits the signal. The thresholds of the frequency bands are tuned individually for a musically pleasing overall tone.

### **Full Band Limiter**

A stereo full band limiter set to a fixed 0 dBFS threshold with an adjustable 0 .. 100 ms lookahead.

## **Transceiver**

Transceiver is a combination of a transmitter and a receiver, and is the "FM radio" within Radiation. It features two stations that generate an FM signal of the input audio and "transmit" them at the selected frequencies and signal strengths, and a receiver that attempts to demodulate the selected FM frequency signal back into audio like an ordinary FM radio receiver. The Transceiver is toggled on and off with the button on the right side of the Transceiver title bar.

## **Station A & B Frequency**

Controllable with either the slider or the frequency display, this is the frequency at which the station transmits its FM signal, selectable in the range 87.5 .. 108.0 MHz.

## **SNR**

Signal to Noise Ratio. Controls the relative strength of the transmitted FM signal, where 0 dB is the level of the background atmospheric noise at that radio frequency. Range -6 .. +30 dB. Higher values result in cleaner signals with less noise.

## **Mod**

The amount of the internal random LFO that modulates the signal to noise ratio.

## **BW Filter**

Toggleable lowpass bandwidth filter at 15 kHz. Applied before the FM modulation and transmitting, it limits the bandwidth of the audio signal to prevent it from interfering with the 19 kHz pilot tone. The pilot tone indicates the presence of a stereo signal to the receiver. The pilot tone is included whenever both left and right inputs are connected.

## **Receiver**

### **Frequency**

Similar to the station frequencies, this is the frequency to which the receiver listens and attempts to demodulate back into audio.

### **Squelch**

Squelch is a noise gate which activates when the strength of the signal received by the receiver becomes too poor. It reduces the level of unwanted noise produced by the receiver. Squelch controls the amount of attenuation applied. Range 0 .. 60 dB.

**Stereo**

A toggle controlling whether the receiver should attempt to demodulate the stereo information from the FM signal. The resulting audio signal is often cleaner in mono, especially with poor signals.

There is also an indicator for whether the receiver is in Stereo mode. This is useful when Stereo has been overridden with a CV input, which disables the Stereo toggle.

**Signal**

An indicator for the received signal strength.

**I / O****Auto Standby**

When switched on, Radiation will automatically perform a fade into standby mode if no incoming signal is fed into any of the inputs. If you want to output the FM radio noise generated by the Transceiver without feeding any input to the device, Auto Standby should be off.

The duration of the fade is adjustable via the Standby Fade control on the rear panel.

**Input Gain**

Gain of the signal connected to the Station A inputs.

**Output Gain**

Gain of the output signal after the last processing stage, be it the Broadcast Processor or the Transceiver, or neither.

**Soft Clip**

Toggles a soft clip applied to the output after the Output Gain. The ceiling is set to -0.1 dBFS.

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**Rear Panel****Station A Input**

Main inputs for the device. Input Gain and Broadcast Processor are applied to these inputs before the signal is fed into the Transceiver. If only the left input is connected, the mono signal will be copied to the right channel for a stereo output.

**Station B Input**

Secondary inputs for the Station B within the Transceiver. If only the left input is connected, the mono signal will be copied to the right channel for a stereo output.

<b>Output</b>	Stereo output after all the processing.
<b>Standby Fade</b>	Controls the duration of the standby fade from 0 to 20 seconds.
<b>CV Connections</b>	<p>CV inputs and corresponding scaling knobs for modulating the device parameters.</p> <p>Limiter Full Enable, Station A BW Filter, Station B BW Filter, Receiver Stereo and Soft Clip are switched on by any positive CV value, and off by any negative CV value. With a CV value of 0 they adhere to their corresponding front panel settings.</p> <p>Receiver Signal Out outputs a value in the range 0 .. 1 depending on the signal to noise ratio of the received signal with an adjustable 12 dB/oct lowpass filter in the range 0.1 .. 50 Hz. Maximum setting disables the filter.</p>

## Latency

The Stereo Widener, Autogain and Multiband Limiter are zero latency. Using the Full Band Limiter adds a variable amount of latency depending on the lookahead setting and the sample rate. Using the Transceiver also introduces a variable amount of additional latency depending on the sample rate. The latencies listed in the table below are in samples.

	Lookahead 0 .. 100 ms	Transceiver
44 100 Hz	2 .. 4480	3
48 000 Hz	2 .. 4864	3
88 200 Hz	2 .. 8896	7
96 000 Hz	2 .. 9664	8
192 000 Hz	2 .. 19264	17

## Thanks

All the beta testers.  
 Laatikko for being my rubber duck during development.  
 FM radio for all the good times during the 1990s.