SW210

A Multiband ‘Airchain’ Audio Processor for AM-Radio Broadcast Services

The Schlockwood SW210 is a fully-featured airchain audio processing system developed specifically to optimize AM radio transmission. The SW210 offers a one-box solution for services ranging from license-free FCC Part 15 ‘hobby’ broadcasters, through speech intelligibility enhancement for ‘ham’ (amateur) radio operators, as well as roadside, airport and other public-service announcement services, to commercial AM standard-broadcast stations and worldwide short-wave broadcasting.

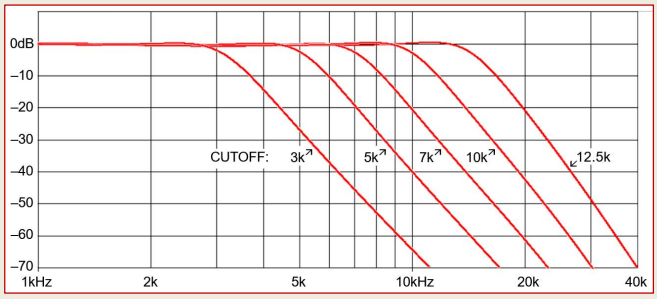
SW210 FEATURES:

- Subtle, gain-riding AGC normalizes long-term level variations between random program sources and music tracks, and helps keep voice-power consistent among multiple speakers.
- A variable ARTICULATION control selectively accentuates the speech-frequency range for better voice intelligibility, including vocals in music-tracks.
- Variable PRE-EMPH. can follow the NRSC pre-emphasis standard, or offers a family of ‘peaking’ curves to further compensate for the poor frequency response of most AM radios.
- Automatic program phase reversal monitors program audio, and can then introduce an inaudible 180-degree ‘roll’ to maintain a predominance of positive-going program peaks.
- A single PROC. DRIVE control sets the desired program density, controlling the amount of 3-band, frequency-discriminate compression, limiting and temporal soft-clipping.
- Adjustable BASS EQ and HIGH EQ program equalization includes a variable BASS SPLIT crossover frequency adjustment to help match the ‘bottom end’ sound to the program format.
- PK. CTRL. varies the tight final peak controller between a smooth, limited-only sound, to one with greater perceived loudness through the introduction of filtered, temporal clipping.
- Regulations permitting, the POS. PEAKS control is able to set output asymmetry between +100% and +200% modulation for positive-going program peaks, relative to negative modulation. This function does not utilize hard switching or negative peak clipping.
- The sharp, overshoot-compensated output filter offers any CUTOFF frequency between 3kHz and 12.5kHz, as required by the SW210’s particular application.
- Annotated LED indicators display AGC Gain, along with the amount of G/R (Gain Reduction) for each band of program dynamic range compression.
- Program audio inputs and outputs are compatible with professional +4dBm balanced studio program lines, as well as ‘prosumer’ –10dBV standards in several configurations.
- Through-hole assembly utilizes common, readily-available, generic component parts to simplify maintenance, and to make user circuit modifications an easy matter.

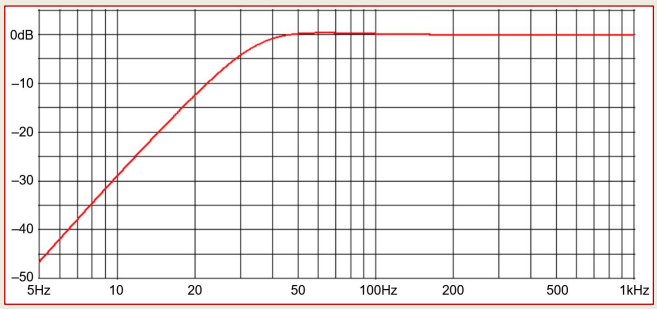
SW210 SPECIFICATIONS

Passband Frequency Response:

With CUTOFF set at maximum, ±0.25dB, 50Hz-10kHz; –3dB at 12.5Khz. CUTOFF filter is continuously variable between 3kHz and 12.5kHz (–3dB) as graphed below.



Variable HF Cutoff Filter Range



High-Pass (Subsonic) Filter

Signal-to-Noise Ratio:

Noise is >70dB below 100% modulation.

Distortion:

<0.25% THD below processing threshold; <1.0% with any degree of processing.

Studio Program Line Input (+4dBu):

Female XLR connector accepts 'Zero-VU' balanced inputs between –11dBu and +19dBu.

'Prosumer' Program Line Inputs (–10dBV):

1: 3.5mm T/S 'mini' monaural phone jack accepts unbalanced mono inputs between –25dBV and +5dBV, corresponding to a "Zero-VU" program level.

2: 3.5mm T/R/S 'mini' stereo phone jack accepts and combines unbalanced L/R stereo inputs between –25dBV and +5dBV, corresponding to a "Zero-VU" program level.

Studio Program Line Output (+4dBu):

Male XLR connector delivers a balanced output variable between –6dBu and +14dBu, corresponding to 100% symmetrical modulation. Source impedance is 200 ohms.

'Prosumer' Program Line Outputs (–10dBV):

1: 3.5mm T/R/S 'mini' stereo phone jack delivers a balanced mono output variable between –25dBV and +5dBV, corresponding to 100% modulation. (*NOTE:* Suitable ONLY for transmitters with balanced inputs!)

2: 3.5mm T/R/S 'mini' stereo phone jack delivers dual unbalanced mono outputs variable between –25dBV and +5dBV, corresponding to 100% modulation. (*NOTE:* This output can feed the unbalanced mono or stereo input of the transmitter.)

AGC

Capture Range: ±15dB; Correction Rate: offset-weighted, averaging approximately 1dB/sec. (Defeatable function)

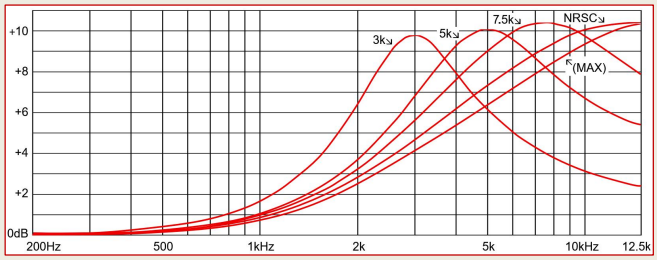
SW210 Rear View

Auto Polarity

This function monitors and automatically reverses program phase to favor maximum positive peak modulation without hard switching or negative clipping. (Defeatable function)

Pre-Emphasis Characteristic:

Program pre-emphasis is continuously variable over the range shown below. (Defeatable function)



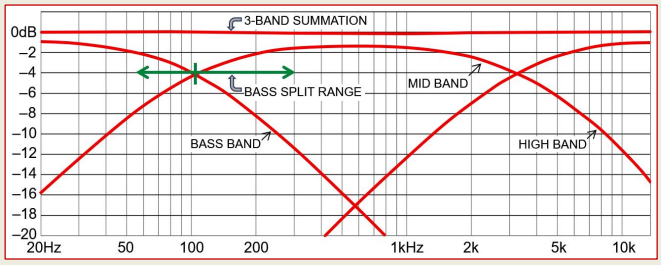
Pre-Emphasis Adjustment Range

Low and High Equalization:

Independent ±8dB control range over the drive to the Bass and High processing bands

Program Spectral Processing:

The audio spectrum is split into three bands, as shown below. Each band undergoes compression, limiting and temporal clipping before recombining.



Processing Spectrum Division

Asymmetrical Peak Controller:

A fast limiter and a filter-embedded clipper in a feedback configuration permit ratio adjustment between the limiting and clipping functions. Positive peaks may be set between +100% and +200% of the negative peak modulation value.

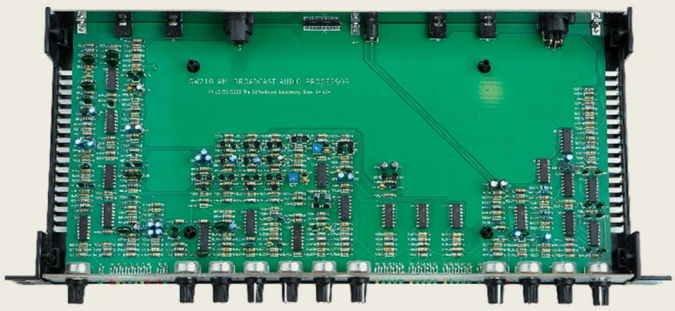
Output Cutoff Filter: (See graph above-left.)

Power Requirement:

A 'universal' regulated and isolated 18Vdc switchmode power adapter is provided with the SW210 to power the processor from AC mains voltages between 100Vac and 240Vac. The SW210 must be used with the supplied adapter (or an equivalent) to ensure proper operation.

Size and Weight:

1-3/4"H x 19"W x 9"D; 4 lbs shipping weight.



SW210 Interior View