MACKIE®
INDUSTRIAL™

SP-DSP1

SOUND PALETTE® Series

Automatic Level Control for the SP1200/SP2400

■ The Mackie Industrial SP-DSP1 is a real-time digital signal processor that can be installed in the SP1200 or SP2400. It uses a proprietary algorithm (patent pending) and adaptive digital filtering to sense noise in a room with an ambient microphone and adjust the gain of the program source accordingly. This unique approach effectively "nulls out" the music sensed at the ambient microphone, allowing the DSP to measure the actual ambient noise level in the room. As the ambient noise level of the room changes, the gain of the program material automatically adjusts to compensate for those changes.

■ The SP-DSP1 is designed to be controlled with the SP-Control™ application running under the Palm™ OS. The SP-Control application is included on a 3.5" floppy disk, and it can also be downloaded from the Mackie Industrial website (www.mackieindustrial.com).

■ Once installed, the SP-DSP1 attenuates the signal by up to 40 dB, depending on the setting of the Minimum Gain control. This determines the lowest level to which the SP-DSP1 can attenuate the program signal.

■ The Gain Range control determines the amount of gain change allowed by the Automatic Level Control. Add this number to the Minimum Gain setting to determine the maximum gain allowable.

■ The Noise Threshold control determines the point at which the Automatic Level Control begins working. When the ambient noise level crosses this threshold, the DSP-1 begins to increase the program signal.

■ The Noise Range control works in conjunction with the Gain Range control. The ratio of the two settings determines how much the program level changes as a function of the change in ambient noise level. For example, if the Noise Range is set to 20 dB and the Gain Range is set to 30 dB, then a 20 dB change in noise level causes a 30 dB change in program level (a 2:3 ratio).

■ The Attack Time setting determines the rate at which the program level increases. The higher the Attack Time setting, the faster the program level increases once the noise level crosses the Noise Threshold.

■ The Release Time setting determines the rate at which the program level decreases. The higher the Release Time setting, the faster the program level decreases once the noise level drops below the Noise Threshold.

■ The SP-DSP1 can store up to ten preset configurations for various functions or applications.

■ The Auto Calibration procedure computes the Room Transfer Function (RTF) and prevents runaway gain.

Features

■ **Adds ambient noise sensing capability to the SP1200 and SP2400 Program Controller/Amplifier**

■ **Adaptive digital filtering analyzes the signal at the ambient microphone and determines the amount of ambient noise in a room**

■ **Automatically adjusts the system gain according to the ambient noise level**

■ **SP-Control™ Palm™ OS application included for remote control**

■ **Adjustable parameters on the Palm™ include minimum gain, gain range, noise threshold, noise range, attack time, and release time**

■ **Bargraph metering on the Palm™ monitors program input level, microphone input level, program gain, and program output level**

■ **Auto-calibration function**

■ **Upload and download capability from EEPROM to SP-Control application**

■ Zoned Music Distribution
■ Automated Noise-Compensating Gain Systems
■ Multizone Paging/Background Music and Speech Reinforcement Systems

SP-DSP1 Automatic Level Control for the SP1200/SP2400
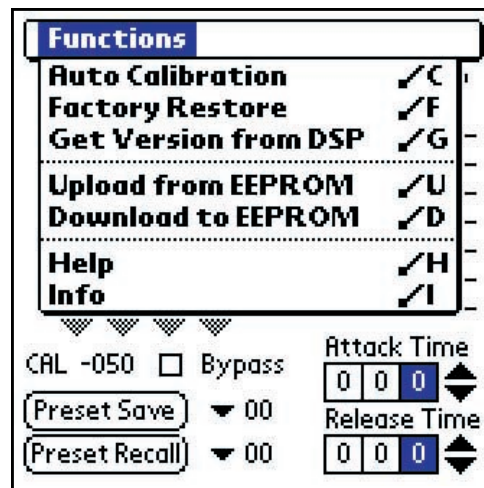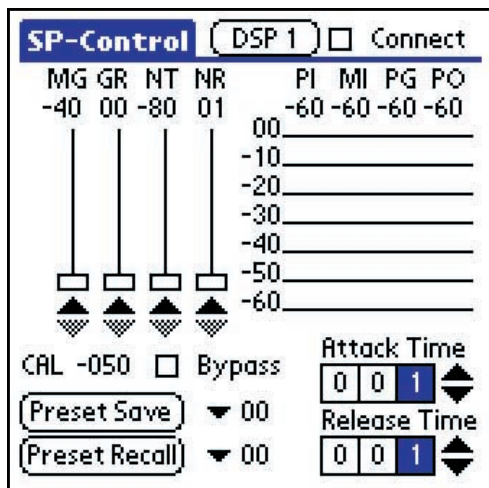
Screen Shots of SP-Control Palm™ Application

Architects' and Engineers' Specifications

The SP-DSP1 shall consist of a DSP card and a power supply expansion card designed to be installed in the SP1200 and SP2400 Program Controller/Amplifier. It shall provide automatic level control for the program signal, dependent on the ambient noise level. It shall use a proprietary ambient noise level sensor algorithm derived from a Normalized Least Mean Square Adaptive Filter (nLMS).

The SP-Control software shall provide a user interface and provide control over the digital signal processing parameters in the SP-DSP1, consisting of the following:

A Minimum Gain control shall provide a gain range from −40 dB to 0 dB. The Minimum Gain setting shall determine the normal operating level of the system prior to the action of the Automatic Level Control.

A Gain Range control shall have a gain range from 0 dB to +40 dB. The Gain Range setting shall determine the maximum level of the system after the Automatic Level Control has been activated.

A Noise Threshold control shall provide a Threshold range from −80 dB to 0 dB. The Noise Threshold setting shall determine the noise level above which the Automatic Level Control begins to operate.

A Noise Range control shall provide a noise range from +1 dB to +60 dB. The Noise Range setting shall determine the rate the program level gain changes as a function of the change in ambient noise level determined by the ambient noise sensor algorithm.

An Attack Time setting shall provide an attack time range from 1 second to 300 seconds. The Attack Time setting shall determine the time for the program gain to increase by 40 dB.

A Release Time setting shall provide a release time range from 1 second to 300 seconds. The Release Time setting shall determine the time for the program gain to decrease by 40 dB.

A Program Input Meter shall indicate the input level to the SP-DSP1 with a range from −60 dB to 0 dB.

A Microphone Input meter shall indicate the ambient microphone input level to the SP-DSP1 with a range from −60 dB to 0 dB.

A Program Gain meter shall indicate the amount of gain the algorithm applies to the program input with a range from −60 dB to 0 dB.

A Program Output meter shall indicate the output level from the SP-DSP1 with a range from −60 dB to 0 dB.

The SP-DSP1 shall have memory allocated in EEPROM to store up to ten presets for the adjustable DSP parameters.

An Auto Calibration function shall be provided to compute the coefficients for the Room Transfer Function (RTF), and optimize the algorithm to reject the music signal and more accurately measure the ambient noise.

The Automatic Level Control shall be a model SP-DSP1 manufactured by Mackie Industrial.

Electronic files for this product available at: www.mackieindustrial.com

This Specification Sheet   SPDSP1.PDF

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