

**Automatic Gain Control
and Speech
Enhancement Add-on
On-line Help
(Version 1.1)**

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1 Introduction

1.1 Overview

Beginning with version 5.0, Total Recorder included support for add-on programs. These add-ons can be used to process a sound stream or to monitor different sound characteristics. The features provided depend upon the particular add-on. To learn more about add-ons, refer to the add-on's help file and to the add-on home page.

The Total Recorder Automatic Gain Control (AGC) and Speech Enhancement Add-on is a multi-purpose program with a number of unique features. Version 1.1 of this add-on requires Total Recorder Version 7.0 or higher.

The main uses of this add-on are listed below.

Controlling the Sound Level

This add-on is designed mainly to control the sound level of speech recording during playback and recording. This add-on does not use the system mixer to modify the sound level. All adjustments are made within the add-on using only digital methods (algorithms).

Correcting the Dynamic Range of Sound

This add-on allows for sophisticated correction of dynamic ranges of sound. For instance, it can perform the functions of Compressor, Limiter, Noise Gate, and more. The add-on's user-friendly graphic interface allows you to adjust precisely the dynamic range modification envelope. Changes being made are displayed on a graph of input vs. output levels.

For those users who are not familiar with detailed adjustments of the dynamic range modification envelope, this add-on offers a variety of different presets. You can use a preset as is, or you can use it as a base and then adjust the settings from there.

Using a Voice Activity Detector to Skip Audio Fragments

A built-in Voice Activity Detector (VAD) helps skip audio fragments that do not contain voice data during audio processing. This greatly improves the accuracy of the add-on's performance on voice recordings because fragments of pure background noise do not affect the algorithm's performance. For example, if VAD is activated, the add-on does not increase the recording level (and correspondingly, the noise) during long pauses as most AGC algorithms do.

Enhancing Speech Recordings by Suppressing Background Noise

Another unique function is the automatic suppression of background noise in voice recordings. This function can either be used separately or together with AGC. For example, you can use the add-on to apply only noise suppression to a voice recording.

WARNINGS

- *Use of the AGC and Speech Enhancement functions requires an adequate level of skill and experience. It is recommended you carefully read the Help files to obtain the best quality audio with this add-on.*
- *When you apply AGC and Speech Enhancement to a file being saved, it is not possible to revert the modifications afterwards. Therefore, it is strongly recommended that you make a backup copy of*

the original recording before applying any AGC and Speech Enhancement functions.

- *If the AGC and Speech Enhancement Add-on is applied during recording, it is advised that you test the parameters you've selected on a test recording or on previously recorded audio material with similar characteristics. It will not be possible to restore the original recording once the add-on is applied.*
- *The AGC and Speech Enhancement Add-on is designed primarily for speech. Use of this add-on for music should be approached with caution, especially during recording.*

Note that all procedures require extensive computations and may lead to gaps in the audio being played back. If such a problem occurs, you can backup your file, apply Add-on procedures to the entire file, and then save the result. If you are not satisfied with the result, you can revert to the backup copy.

1.2 Product Registration

After installing and verifying the add-on works properly, you should obtain a registration key from High Criteria. An unregistered add-on can be used as long as you want. However, it generates a 1-second noise every 1 minute.

To register the Total Recorder AGC and Speech Enhancement Add-on:

1. Receive the registration key. Follow the instructions given on High Criteria Inc.'s web site at the following address: <http://www.totalrecorder.com/AddOnMain.htm>
2. In Total Recorder's main menu, select "Help" - "Add-on registration...". Type in the same name you used to obtain the registration key, and type your registration key.

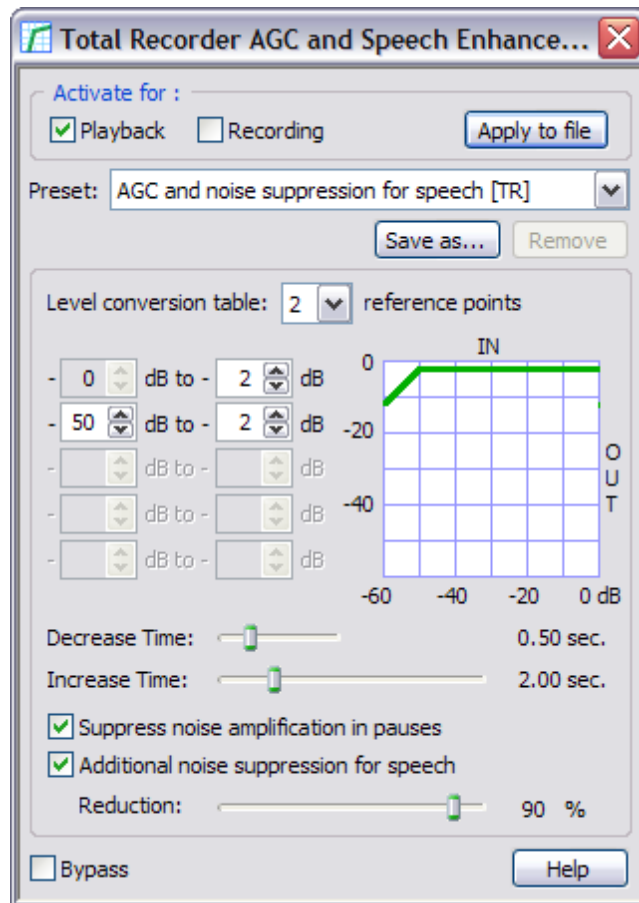
2 Using the Automatic Gain Control and Speech Enhancement

2.1 Automatic Gain Control and Speech Enhancement



Using the Automatic Gain Control and Speech Enhancement

To use the AGC and Speech Enhancement:

1. From the "Process" menu, select "AGC and Speech Enhancement". This opens the Total Recorder AGC and Speech Enhancement dialog shown below.



2. Select “Playback” or “Recording” to indicate when the AGC and Speech Enhancement will be used.
3. From the “Preset” drop-down list, choose a preset, or adjust the controls as desired.

When the Automatic Gain Control (AGC) and Speech Enhancement add-on is active, the audio stream passes through this add-on, and the AGC and Speech Enhancement icon in the Total Recorder's “Status” panel is highlighted as . When the AGC and Speech Enhancement is inactive, the icon appears as grayed out .

Detailed information about in the AGC and Speech Enhancement dialog follows.

Level conversion table determines the shape of the dynamic range correction envelope. The current shape of the envelope is displayed on the IN vs. OUT graph. This graph shows the envelope that will be applied to the input signal, depending on its level over time. A diagonal line (with no conversion preset) indicates where the input and output levels are equal. To determine the shape of the envelope directly, you must set the **Reference points** parameter to the number of points that will determine the shape of the envelope. You can set from 1 to 5 **Reference points**. After that, you need to indicate the level of the input and output signals (in dB) below for each reference point.

Decrease Time and **Increase Time** determine how quickly the algorithm changes the sound level. The Decrease Time slider determines how quickly the algorithm decreases the sound level. The Increase Time slider determines how quickly the algorithm increases the sound level.

Suppress noise amplification in pauses activates the VAD (Voice Activity Detector). When this function is active, the AGC algorithm reacts only to sound fragments that contain voice. This makes the algorithm's performance more accurate when processing voice recordings and prevents the program from

raising the noise level during long pauses.

Additional noise suppression for speech activates additional suppression of background noise for speech.

Reduction determines the amount of noise being removed, when the Additional noise suppression for speech checkbox is selected. The range is from 0 to 100%. Note that the maximum value of this parameter (100%) results in noise suppression of approximately 15 – 20 dB. The exact result depends on the particular speech recording. The higher this setting, the more noise the algorithm removes. However, a higher “Reduction” value will lead to distortion. In most cases, it is sufficient to set this value in the range from 70% to 90%.

Applying Automatic Gain Control and Speech Enhancement to an Entire File

To apply Automatic Gain Control and Speech Enhancement to an entire file and save the changes, take the following steps:

1. Make a backup copy of the file.
2. Open the file.
3. From the Total Recorder AGC and Speech Enhancement dialog, select “Playback”.
4. Listen to the file.
5. Adjust the settings on this dialog, as required.
6. Use the “Apply to file” button.

Adding a Preset

To add a preset, take the following steps:

1. Set the controls as required.
2. Click the "Save as" button.
3. Enter a name for the preset. You can use up to 99 characters.

The new preset is added to the Preset drop-down list.

Disabling Automatic Gain Control and Speech Enhancement Temporarily

If you wish to temporarily disable the Automatic Gain Control and Speech Enhancement, select the “Bypass” check box. This function is useful when you need to compare the original sound with the modified sound during playback.

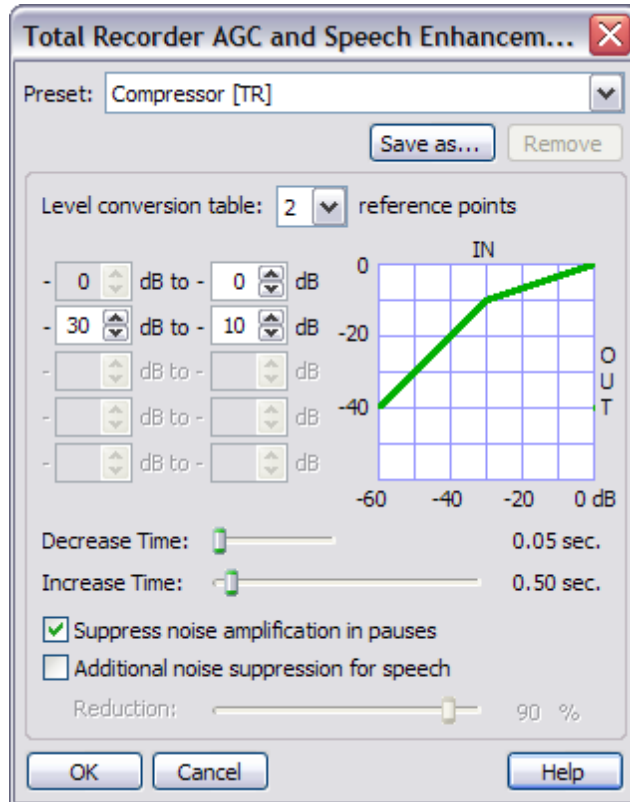
WARNINGS

- *When a file is being played back or recorded, it is not recommended you select/clear the “Playback” or “Recording” boxes, change presets, or modify other settings. All these actions may result in sound distortion (e.g. clicks). Also, if the distortion occurs during recording, it cannot be removed later.*
- *The add-on is optimized to work primarily in the AGC, Compressor, and Limiter modes (or a combination of these modes). If you use the Noise Gate mode in any combination, you should set the **Decrease Time** and **Increase Time** parameters to numbers close to their minimum values (for example, 0.05 or 0.1 sec.).*
- *The **Additional noise suppression for speech** function can be used effectively only for recordings of speech. Using this function for music may lead to unwanted distortion.*

Using the Automatic Gain Control and Speech Enhancement during Batch Processing (Professional and Developer Editions of Total Recorder only)

To use the Automatic Gain Control and Speech Enhancement during batch processing:

1. In Total Recorder's "Batch Processing Wizard – Choose Operations" dialog, select "AGC and Speech Enhancement", and press the "Parameters..." button. This opens the Total Recorder AGC and Speech Enhancement dialog for batch processing, as shown below.



2. From the "Preset" drop-down list, choose a preset, or move the sliders as desired.
3. Press "OK".

2.2 COM and Automation (Total Recorder Developer Editions only)

With Total Recorder Developer Edition, you can control add-ons using the COM and Automation technologies. The following properties and methods are available: AddonsCount, AddonName, AddonNumber, AddonParamsCount, AddonParamName, AddonParamNumber, AddonParamValue, AddonExecuteChanges. For detailed description of all properties and methods, refer to the Automation Online Help supplied with the Developer Edition of Total Recorder.

All parameters available with the Automatic Gain Control and Speech Enhancement Add-on, Version 1.1, are listed in the table below:

Number	Name
0	Version number
1	Add-on window is open/closed (0 or 1)
2	Add-on settings are applied for playback (0 or 1)
3	Add-on settings are applied for recording (0 or 1)
4	Add-on settings are applied for saving (0 or 1)
5	Add-on Bypass mode is on/off (0 or 1)
6	Reference points (from 1 to 5)
7	Argument for reference point 1 (0)
8	Argument for reference point 2 (from 0 to 99)
9	Argument for reference point 3 (from 0 to 99)
10	Argument for reference point 4 (from 0 to 99)
11	Argument for reference point 5 (from 0 to 99)
12	Level of reference point 1 (from 0 to 99)
13	Level of reference point 2 (from 0 to 99)
14	Level of reference point 3 (from 0 to 99)
15	Level of reference point 4 (from 0 to 99)
16	Level of reference point 5 (from 0 to 99)
17	Decrease Time setting (from 0.05 to 2.0 sec.)
18	Increase Time setting (from 0.05 to 10.0 sec.)
19	VAD is on/off (0 or 1)
20	Additional noise suppression for speech is on/off (0 or 1)
21	Reduction setting (from 0.0 to 1.0)

Notes

If some parameters are set incorrectly or an invalid combination is chosen, then some parameters may not be changed.

The "Version number" parameter cannot be changed. This parameter has been converted from a DWORD type to a float type, where the high word corresponds to the high version number and the low word corresponds to the low number. Therefore, for Version 1.1, this parameter equals 65537.0.

When changing the above parameters, note the following:

- The add-on can be in only one mode at a time (i.e. playback, recording, or saving). This means that only one of the 2, 3, 4 parameters can be set to 1.
- If the add-on is in saving mode (parameter 4 is set to 1) then only parameter 1 can be changed
- Saving mode cannot be disabled by setting parameter 4 to 0. To disable saving mode, it is necessary to undo the changes (Document.Undo method), save the file (Document.Save or Document.SaveAs method), or close the file without saving (Document.Close method). This will change parameter 4 to 0.
- Saving mode and Bypass mode cannot be on at the same time because properties 4 and 5 cannot both be equal to 1.