



## ASET Tuner Manual

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## 2. Preface

### 2.1 About

In this manual, The ASET sound effect system's rationale and how it works will be introduced, so that the customer could improve their relative ability.

### 2.2 IC Support List

IC model supports their corresponding ASET sound effect algorithm as follow:

IC 型号	均衡器	低音增强	高音增强	限幅器/压缩器	动态范围控制	音效增强	音效减弱	信号检测
ATS282X	20	√	√	√	两段/三段	√	√	√
ATS282XC	20	√	√	√	两段/三段	√	√	√
ATS281X	14	×	×	限幅器	×	×	×	×
7059C	14	×	×	×	两段	×	×	×

## 3. ASET Algorithm Intro

### 3.1 Algorithm Brief

ASET is a sound effect adjust system developed by Actions. Customer can adjust the sound effect of their soundbox efficiently in real time with it.

ASET offers friendly UI and support adjusting online, and it is quite convenient.

### 3.2 Algorithm features

1. Up to 20 EQ setting and each EQ point parameters could be adjusted independently.
2. Support 2/3 segments DRC, and let "small soundbox" show "great effect"
3. Through POST EQ, it perfectly solves the "dry" and "manic" problems after DRC.
4. Sound enhancement can intelligently optimize the bass effect of low volume, making the low frequency of small volume better.
5. The sound attenuation can intelligently reduce the crack of high volume, so that the high volume can be displayed perfectly.
6. Signal detection by detecting the signal during music playing, and adjusting the EQ of each band dynamically. There is a perfect display no matter it is disco music or jazz.
7. The virtual low-frequency technology uses the harmonic method to display stronger low frequency through human psychology.
8. Support front/rear volume, and 31 levels different sound effects.
9. The tuning tool realizes "what you see is what you get" and really lets sound effect be in the hands of the tuner.

### 3.3 ASET Specification

Eight modules are included in ASET sound effects: equalizer, bass enhancement, high-pitch enhancement, limiter (compressor), dynamic range control, sound effect enhancement, sound effect attenuation, signal detection and other modules. In addition, the parameters of each module could be adjusted individually.

PS: different IC supports different ASET modules. As the list follows.

### 3.3.1 Equalizer PEQ

The PEQ of ASET could support 20 PEQ points. Each point can be set to SpeakerEQ and PostEQ state. SpeakerEQ state indicates that the PEQ point is placed before MDRC; PostEQ state indicates that the PEQ point is placed after MDRC. Both Each PEQ point gain and Q value can be adjusted individually.

### 3.3.2 Bass Enhancement

ASET's bass enhancement adopts the advanced algorithm VBASS, so that the **small cavity** can also reflect the shock power of the bass perfectly. The bass effect of different **lumens** is shown by adjusting the **bass gain** and the **up to frequency**.

### 3.3.3 High Pitch Enhancement

ASET's high-pitched enhancement adopts advanced intelligent algorithm PEQ, which makes the high-pitched part brighter and crisper with penetrating power. show different high-pitched effects by adjusting the pitch gain and the up to frequency

### 3.3.4 Limiter (Compressor)

The limiter module of ASET is used to prevent signal overflow and **power over standard breaking**. The threshold of the limiter can be set to limit the output power, and the starting time and release time can be set to adjust the opening and closing time of the limiter.

### 3.3.5 Dynamic Range Control

The dynamic range control uses three segments of DRC, which can perfect the dynamic range of the frequency bands of the music signal and improve the loudness of the signal. The threshold, frequency division point, compression ratio, startup and release time of each segment of DRC can be adjusted separately. ASET supports the setting of different DRC parameters in the AUX mode and the non - AUX mode, making the music in all kinds of applications a perfect display.

DRC is divided into two modes: smart DRC and standard DRC. Intelligent DRC algorithm will automatically adjust DRC threshold according to the volume level, make pre-compensation, limit threshold and other intelligent gain compensation, so as to ensure perfect sound experience at small volume, medium volume and large volume. The standard

DRC algorithm allows the customer to set up various parameters such as DRC, gain compensation, signal compensation, pre attenuation and other parameters, allowing all kinds of parameters to be set up at various volume levels to meet customer's personalized sound effect customization.

### 3.3.6 Sound Effect Enhancement

ASET support audio enhancement in small volume / small signal, reflect the bass or other frequency response better, to a certain extent, make a dynamic bass boost and support PEQ; 5 PEQ upgrade, each PEQ point can be individually set work volume or signal range.

### 3.3.7 Sound Effect Attenuation

ASET audio support the bass or other frequency points slightly reduced when the volume reduced / large signal frequency response. To prevent the speaker in clipped great volume or signal, which make a dynamic PEQ support in some degree; ASET also support reducing the bass and 5 PEQ point decreased, each PEQ point can set up separate in work volume or signal range.

### 3.3.8 Signal Detection

ASET signal detection module is applied to AUX module. When AUX comes in and music signal is smaller, the bass or a certain frequency can be raised appropriately by adjusting the sound effect enhancement module. so that the hearing sense of the small signal is more powerful. When the AUX in music signal is larger, by adjusting the sound module appropriate and to reduce the bass or a certain period of frequency, making a perfect embodiment of the volume of high quality music and large signal is not easy to break the sound.



## 4. ASET Tool Description

The ASET (Audio Sound Effect Tuning Tool) is a PC Tool developed by Actions to adjust ASET Sound. It is a real-time, highly effective tool for tuning the sound box. Through ATD communication methods, the related parameters in the speaker are revised, and user can hear the sound effect of the modified speaker in real time, achieving the goal of efficient debug.

### 4.1.1 ASET Functions

- 1) Real-time debugging of various parameters and functions.
- 2) Support to save the current debugging Settings as templates for next use.
- 3) Support import and export parameters.
- 4) Support to export parameters according to the specified template format.
- 5) Support online debugging mode and offline mode.

### 4.1.2 ASET installation and authentication

In the ASET software installation package, click on the Setup.exe tool installation, after installation can be in the start menu - > Actions tools - > ASET debugging tools. Then click on the tools icon under menu can open this tool.

After installation, it must be verified before it can be used. The authentication method is as follows:

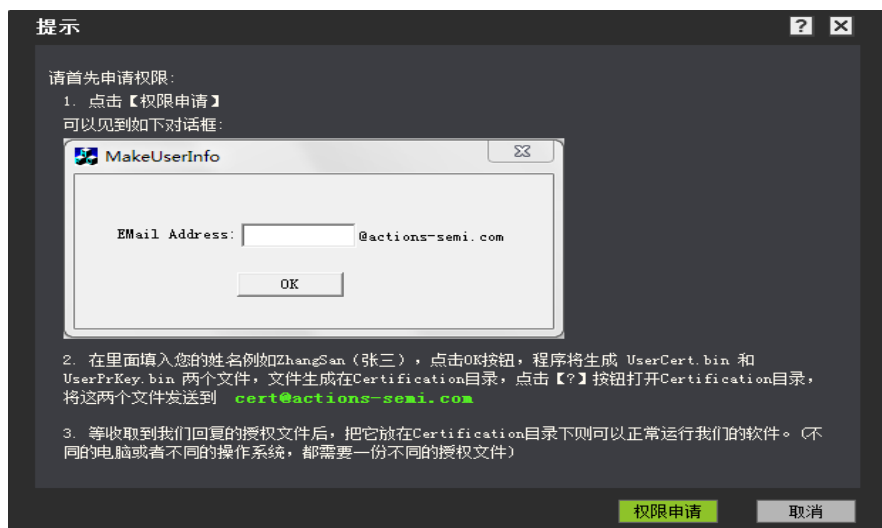


Fig 1 permission application dialog box.

### 4.1.3 Specification of Firmware Configuration

All ASET configuration items are listed in case\fwpkg\config\_txt\\*.txt, named after ASET\_XXX format, these configuration items corresponding to the parameters of the algorithm modules. User should notice that all the parameters are converted to an integer because of Actions platform does not support floating-point calculations, each conversion relationship in each parameters is explained in the comments.

ASET configuration item is numerous, the parameters and ASET tools are not completely consistent, need to be transformed. ASET tools configuration parameter values in the transfer to the configuration file is a tedious and error-prone. So the ASET tool provides a function that exported configuration items to \*.txt file in accordance with the requirements for the firmware file, user just replace the corresponding parts in the firmware file configuration items after the export.

### 4.1.4 ASET User Guide

The ASET tool relies on ATD drive which is a USB communication protocol developed by Actions independently.

When ASET is installed, ATD driver will be integrated automatically, as long as device connect the normal PC cable, then click on the tool interface connection button, user can see the ATD devices in device manager, as the following figure 2:

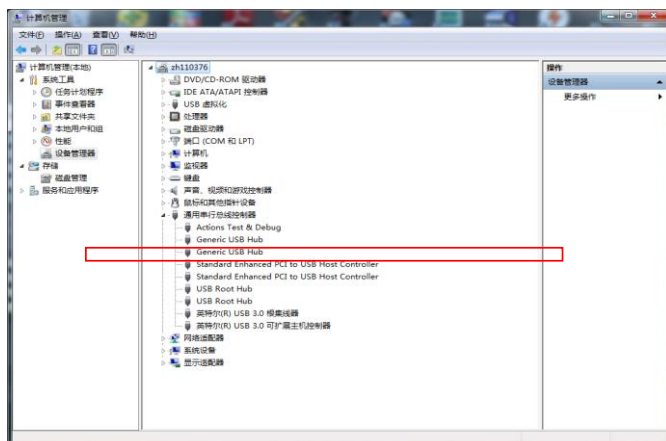


Fig 2 ATD device

After opening the tool, the connection interface appears. If you connect to USB and enter the U disk mode, you can click the "connect" button and enter the online debugging mode. If you don't want to debug, you want to see the last configuration result, or generate the parameter file for ASET, or export the configuration file \*.txt, and you can select the offline mode to enter. Figure 3 below:



Fig 3 ASET tool

Click "connect immediately" or "offline mode", as shown in figure 4 below:

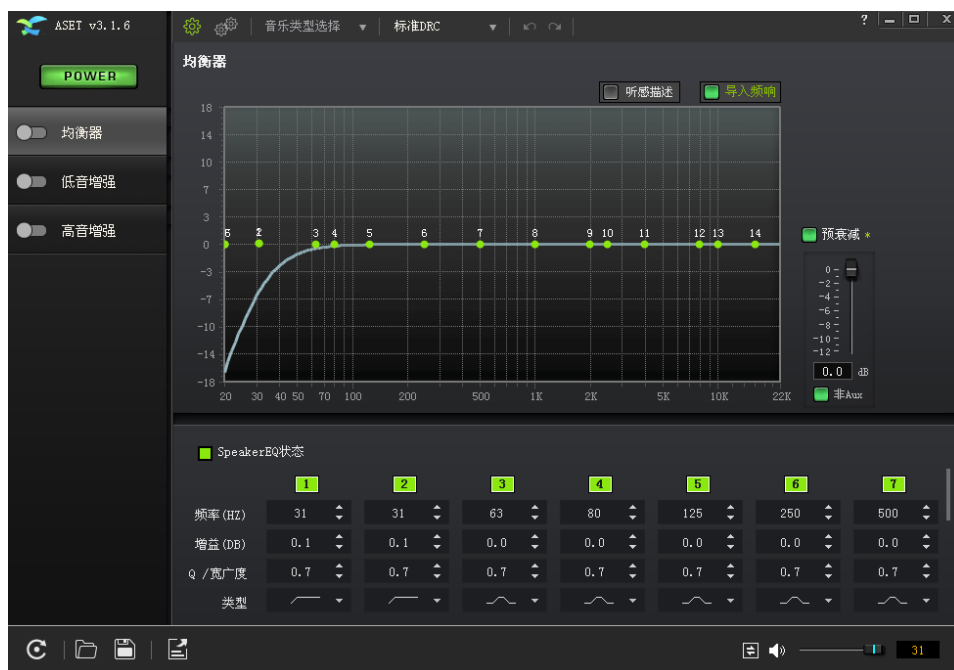


Fig 4 ASET interface

## 4.1.5 ASET Main Interface

The ASET home page can complete editing and some general Settings.as the following:

1. The four buttons in the lower left corner of the main page are common functions. The first one resets all data, and the second one is to load the parameters saved last time. The third is to save the parameters of this debugging; The fourth is to export the debug parameters in the format of the firmware configuration file.



Fig 5 common functions interface

2. Tool selection interface. There are three options in the upper left corner of the tool. The first one is "simple mode" and "advanced mode"; The second music type selection has four styles: popular music, scene music, rock style and classical style, etc. The third is the choice of "smart DRC" and "standard DRC" mode.



Fig 6 mode selection interface

- On the left side of the main page, there is a total switch "POWER" button, which is opened by default. If it is closed, all sound effects modules will be closed. **Each module of ASET can be turned on and off by the buttons on the left.** The simple mode has four modules, and the advanced mode has eight modules. See figures 7 and 8 below.



Fig 7 simple mode





fig 8 advanced mode

- There is a volume control button in the lower right corner of the main page, which can adjust the volume of the sample machine online.



Fig 9 volume control button

- At all levels, the button is set at the same level, on the left side of the volume button.  Indicates that the parameters of the volume at all levels can be incongruent.  Indicates that the parameters at all levels are automatically changed to the current level.

#### 4.1.6 ASET Equalizer Interface

The equalizer page can adjust the pre attenuation, equivalent pre-attenuation, and various parameters of 20 PEQ points.

1. Equalizer page has "import frequency response" and "curve contrast" button, it is to import by the AP test tool to measure the frequency response curve, and displayed in the equalizer workspace, EQ curve can be used to compare the debugging, the accurate reference prototype EQ curve; The import curve supports files in TXT format and Excel format. The curve is used to contrast the set of EQ parameters, and then compare the auditions.



Fig 10 Import the curve

Describe sense button, there you will have a window, display the current mouse real-time in frequency corresponding subjective listening description, it can help us more directional control EQ curve, and it can help debug researchers study the tuning experience.

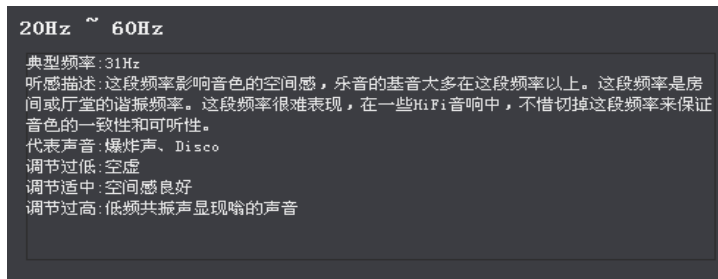


Fig 11 sense description

Pre attenuation setting, pre-attenuation means pre-attenuation before signal processing; In the intelligent DRC mode, the power regulation of small and medium volume; Equivalent damping, sound effects in regulating the signal is the effective value of ascension, estimates that only works when the MDRC opened, according to the PEQ enhance the overall size of estimating a value, if you don't want too much computing the size of the overall ascension, you can use experience - 3 db, and no longer changes.

**PS: in standard DRC mode, only pre-attenuation, and can set different values of AUX and non-aux modes respectively.**



图 12 Pre-attenuation, smart and standard mode

4. PEQ point setting can adjust the state, gain, Q value and type of PEQ point. The types of ASET support frequency points include: Peaking, High pass, Low pass, Low shelf, High shelf.

PS:

(1). When the PEQ frequency point is set to "High pass" or "Low pass", the PEQ point gain needs to be set to a non-zero value, High pass to be effective, such as the need to more than 60 hz high pass, point the PEQ frequencies is set to 60 hz, gain is set to 0.1 dB, Q value is set to 0.7, the type is set to High pass.

(2). Speaker EQ means that the EQ point is placed before DRC, and PostEQ refers to the EQ point after the DRC and limit. When the PEQ point is set to PostEQ, special attention should be paid to the final power of the frequency point to not exceed the standard, and it is better to set the negative gain.

(3). When PEQ is marked green, the current PEQ point is Speaker EQ; When PEQ is marked orange, the current PEQ point is PostEQ, as fig14.



Fig 13 PEQ setting

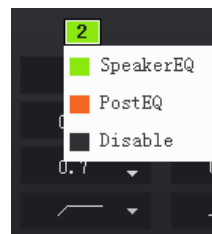


Fig 14 PEQ type setting

5. Curve comparison function, this function can debug several curves on PEQ, and then compare the auditions separately, so that user can choose the best curve.



Fig 15 Curve contrast

## 4.1.7 ASET bass enhancement interface

The bass enhancement page has two parameters that can be adjusted, one is the bass enhancement gain, the other is the bass enhancement cutoff frequency; Different bass requirements different values adjusting.

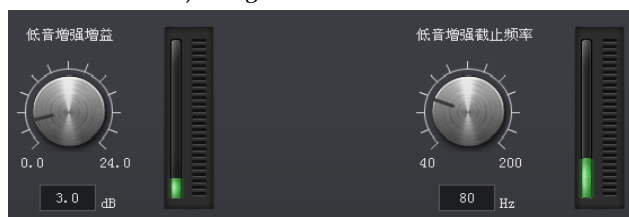


Fig 16 bass enhancement interface

## 4.1.8 ASET high pitch enhancement interface

There are two parameters that can be adjusted for the high-pitched enhancement page. One is the high-pitched gain, and the other is the bass enhancement cut-off frequency. Different high-pitched demands adjust different values.

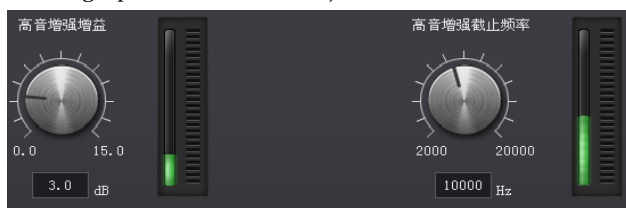


Fig 17 high pitch enhancement interface

## 4.1.9 ASET Limiter (Compressor) Interface

1. In the smart DRC mode, it is called the limiter, and the page has three parameters to adjust: **threshold**, **startup time**, and **release time**.

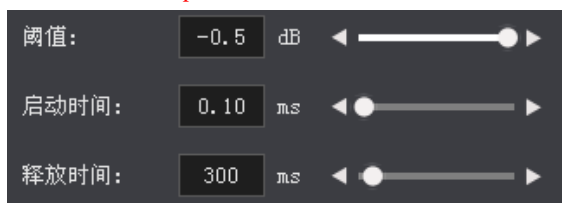


Fig 18 Limiter Interface



- In the standard DRC mode, known as the compressors, there are seven parameters can be adjusted: **threshold 1, compression ratio 1, threshold 2, compression ratio 2, RMS detection average time, startup time and release time**. This tool also support for adjusting different parameters in AUX mode and non-aux mode.



Fig 19 Compressor Interface

## 4.1.10 ASET Dynamic Range Control Interface

Dynamic range control page parameters can adjust many parameters; There are smart DRC mode and standard DRC mode, and three section DRC or two section DRC can be supported in standard mode. In each mode, the AUX mode and the non-aux mode are subdivided to support different MDRC parameters in the four cases.

- **Smart DRC mode**

- Power fine tuning: slight adjustments to the final output signal, such as balancing the input size of different signal sources
- Signal attenuation: the output power of fine adjustment, such as the balance of output power of different signal sources, etc.
- Limiter difference**: adjust the dynamic range of MDRC to avoid **distortion and noise**

These three parameters can adjust the **automatic compensation size after MDRC compression**. Generally, default setting is enough.



Fig 20 smart DRC parameter setting 1

4. ASET algorithm supports three sections of DRC, which can set the frequency range of the three DRC by adjusting the "low middle frequency point" and "high middle frequency point"; Each DRC can adjust the threshold, startup time, and release time.

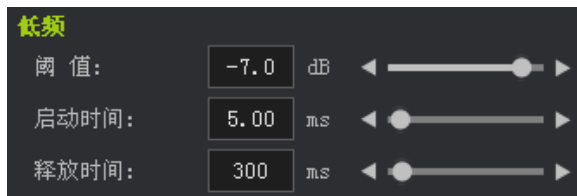


Fig 21 smart DRC parameter setting 2

## ● Standard DRC mode

1. Three DRC and two DRC: support for three DRC and two DRC selection switches.
2. Sensitivity: the digital gain adjustment before MDRC can adjust the input sensitivity of different applications.
3. Power adjustment: the digital gain adjustment after MDRC can adjust the output power of different applications.
4. Compensation filter: in order to effectively eliminate the bump of the DRC first divider point; You can set thresholds, Q values, startup time, and release time. The threshold value is referred to as the DRC threshold, for example, the central frequency threshold of DRC is -8db, and the threshold value of the compensation filter is set to -6db, then the raised point amplitude =  $(-6)-(-8) = 2\text{dB}$ .



Fig 22 Standard DRC parameter setting 1

5. The standard DRC is also divided into three sections of DRC, which can set the frequency range of the three-segment DRC by adjusting the "low middle frequency point" and "high school frequency point". Each DRC can adjust **threshold 1**,

compression ratio 1, threshold 2, compression ratio 2, RMS detection average time, start-up time and release time.



Fig 23 Standard DRC parameter setting 2

**PS:** standard DRC support setting for some parameters under different values at all levels of the volume, in order to fine tune the volume down the best audio-visual effects, in front of the parameter name, there will be a "star" as its "attenuation", "threshold 1", "threshold 2", etc.

## 4.1.11 ASET Sound Enhancement Interface

Sound enhancement page: the effect is to enhance sound effects at a small volume.

PS: sound enhancement is gradual, from "threshold value" to "retention threshold" is gradual change, the strongest sound effect is after "maintain threshold".

1. **Audio enhancement peak ratio:** this parameter is used to ensure sound enhancement will not lead to a broken sound distortion, sudden big and small etc. If the sound effects to enhance to enhance a few very close to the PEQ point, because this a few PEQ point influence each other, then the value will be a bit bigger; Generally, you do not need to change the default values.
2. **High pass weakens:** if the high pass filter is used in PEQ, the bass effect will be enhanced if the high pass is weakened. High pass cutoff frequency refers to the minimum frequency of high pass filtering to this frequency point.
3. **Low frequency enhancement:** low frequency enhancement frequency point can be set in PEQ for bass enhancement.
4. **Enhanced bass enhancement:** when the "bass enhancement module" is used, the corresponding value is set to "1", indicating that the gain of the "bass enhancement" module can be enhanced.
5. **High frequency enhancement:** high frequency enhancement frequency points can be set in PEQ for high-pitched enhancement.

6. **Enhanced pitch enhancement**: when using the "high-pitch enhancement module", the corresponding value is set to "1", indicating that the gain of the "high-pitch enhancement" module can be enhanced.
7. **The sound enhancement frequency point** supports the enhancement of the frequency points used by 3 PEQ. **It is necessary to ensure that the frequency point value is equal to some frequency point in PEQ**, otherwise it is invalid.
8. **Threshold value**: the threshold value that the sound effect begins to increase.
9. **Maintain threshold**: when the sound effects are enhanced to this threshold, the "increase amplitude" remains unchanged.
10. **Enhancement amplitude**: the maximum sound enhancement of this frequency point.



The interface displays several control panels for sound effect enhancement:

- 高通减弱 (High Pass Filter Attenuation)**: High pass cutoff frequency: 40 Hz, Pre-boost: 0, Start threshold: -15 dB, Maintain threshold: -40 dB, Attenuation amplitude: 3.0 dB.
- 低频增强 (Low Frequency Enhancement)**: Low frequency point: 80 Hz, Enhance low frequency: 0, Start threshold: -15 dB, Maintain threshold: -40 dB, Enhancement amplitude: 3.0 dB.
- 高频增强 (High Frequency Enhancement)**: High frequency point: 4000 Hz, Enhance high frequency: 0, Start threshold: -15 dB, Maintain threshold: -40 dB, Enhancement amplitude: 3.0 dB.
- 任意频点1 (Arbitrary Frequency Point 1)**: Frequency point: 125 Hz, Pre-boost: 0, Start threshold: -15 dB, Maintain threshold: -40 dB, Enhancement amplitude: 3.0 dB.
- 任意频点2 (Arbitrary Frequency Point 2)**: Frequency point: 1000 Hz, Pre-boost: 0, Start threshold: -15 dB, Maintain threshold: -40 dB, Enhancement amplitude: 3.0 dB.
- 任意频点3 (Arbitrary Frequency Point 3)**: Frequency point: 8000 Hz, Pre-boost: 0, Start threshold: -15 dB, Maintain threshold: -40 dB, Enhancement amplitude: 3.0 dB.

Fig 24 sound effect enhancement interface

## 4.1.12 ASET Sound Attenuation Interface

Sound attenuation page: the effect is to reduce the sound effect at high volume, to prevent the distortion or breaking of a certain frequency point. Note: the sound attenuation

is gradual, from "threshold value" to "retention threshold", which is gradually changed to the minimum after "threshold".

1. High pass enhancement: if the high pass filter is used in PEQ, the bass effect will be weakened if the high pass is enhanced. High pass cutoff frequency refers to the frequency of the cutoff frequency of high pass filtering.
2. Low frequency: low frequency attenuation frequency, can set some low frequent points in PEQ to reduce the bass.
3. Reduced bass enhancement: when the "bass enhancement module" is used, the corresponding value is set to "1", indicating that the gain of the "bass enhancement" module can be reduced.
4. High frequency attenuation: high frequency attenuation frequency point, user can set some high frequency point in PEQ to carry on the high pitch attenuation.。
5. Attenuation high pitch enhancement: when the "high-pitch attenuation module" is used, the value is set to "1", indicating that the gain of the "high-pitch enhancement" module can be reduced.
6. The sound attenuation frequency point supports the attenuation of the frequency points used by 3 PEQ. It is necessary to ensure that the frequency point value is equal to some frequency point in PEQ, otherwise it is invalid.
7. Threshold value: the threshold value that the sound effect begins to weaken.
8. Maintain threshold: when the sound effects are reduced to this threshold, the "reduced amplitude" remains unchanged.
9. Attenuation: the maximum sound attenuation of the frequency point.

### 高通增强

高通截止频率: 65 Hz 预留: 0 开始阈值: -5 dB 保持阈值: 0 dB 增强幅度: -1.0 dB

### 低频减弱

低频频率点: 80 Hz 减弱低音增强 0 开始阈值: -5 dB 保持阈值: 0 dB 减弱幅度: -2.0 dB

### 高频减弱

高频频率点: 4000 Hz 减弱高音增强 0 开始阈值: -5 dB 保持阈值: 0 dB 减弱幅度: -2.0 dB

### 任意频点1

频率点: 125 Hz 预留: 0 开始阈值: -5 dB 保持阈值: 0 dB 减弱幅度: -2.0 dB

### 任意频点2

频率点: 1000 Hz 预留: 0 开始阈值: -5 dB 保持阈值: 0 dB 减弱幅度: -2.0 dB

### 任意频点3

频率点: 8000 Hz 预留: 0 开始阈值: -5 dB 保持阈值: 0 dB 减弱幅度: -3.0 dB

Fig 25 Sound effect attenuation interface

## 4.1.13 ASET Signal Detection Page

Specially designed for AUX application signal detection, there are five parameters can be adjusted, generally the default setting is ok.

1. Signal detection period: represents the time required to detect the signal.
2. Signal detection cycles: how many cycles are needed to indicate the signal.
3. Small signal pre-fall threshold: indicates that the signal needs to reach the threshold before it is released.
4. Small signal pre-descending cycles: how many cycles are required after the signal reaches the threshold to be released completely.
5. Signals effective minimum size: the size of the test results will be restricted is greater than or equal to the minimum, this is used to prevent because of the detected signal is too small, the enhanced sound too much, lead to the problem of low signal noise ratio (SNR).The range is 0dB ~ -80db, and the default is -60db.



Fig 26 signal detection page

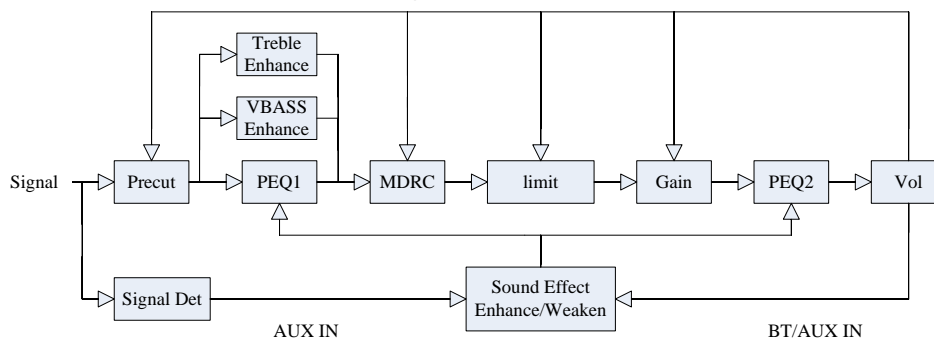
## 5. Sound Debugging Method

### 5.1 Sound Debugging Process

Sound adjustment is a complicated process. A good tuner needs to have the audio debugging and audio test capability of the hardware engineer. At the same time, it also requires the listening ability. In addition, a good tuner should adjust different parameters according to different sound effects process in order to get the best sound effect.

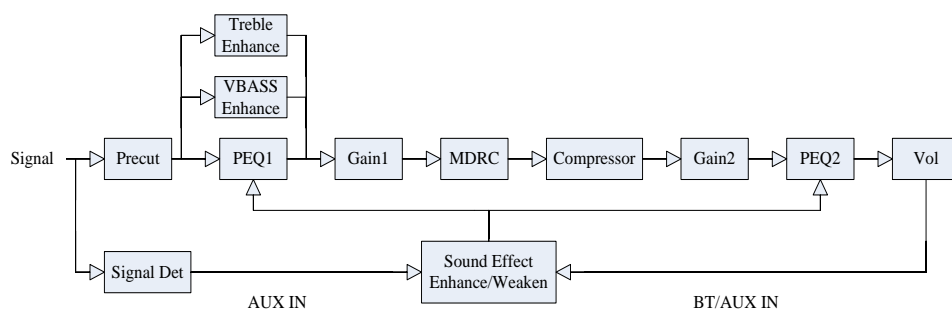
#### 5.1.1 ASET sound flow chart in smart mode

US282X ASET smart mode sound signal process:



## 5.1.2 ASET Standard Mode Sound Effect Flow

US282X ASET standard mode sound signal process:



## 5.1.3 Tuning Process of Sample Speaker

The general tuning process is as follows: firstly, the debugging and testing of the hardware platform of the prototype itself; then close ASET sound effects and test audio indicators; at last, add ASET sound effects, debug ASET parameters and retest the audio indicator parameters.

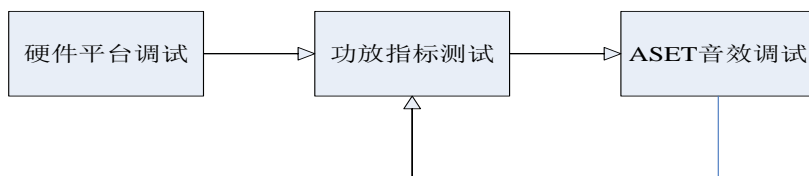


Fig 27 tuning flow chart 1

## 5.1.4 Tuning Process of Same Cavity Body

If there is a comparison reference prototype, and the sample machine and reference prototype are used in the same cavity; We can refer to the electrical signal indicator and the sound signal indicator of the sample machine first, and then the sample machine can be adjusted by adjusting the parameters to make the electric signal and the reference prototype consistent.。



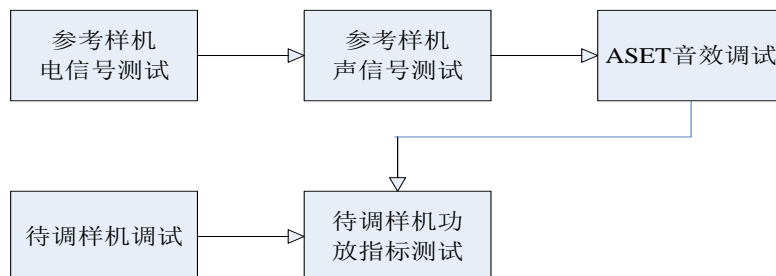


Fig 28 tuning flow chart 2

## 5.1.5 Tuning Process of Different Cavity Body

If there is a comparison reference prototype, but the sample machine and reference prototype use different cavity; First, test the electrical signal of the reference prototype for reference, and then test the sound signal of the reference prototype; The sound signal is tested by listening or acoustic instrument to ensure that the sound signal is in accordance with the sample machine, and then the sound parameters can be fine-tuned through the **audition**.

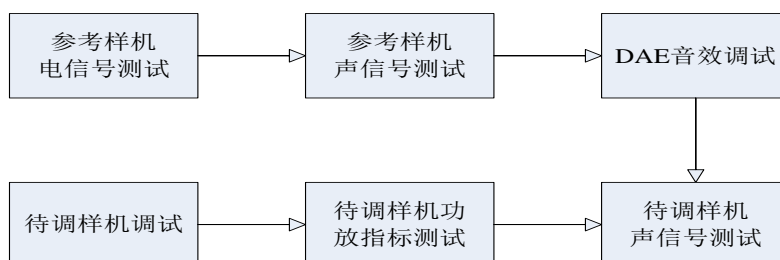


Fig 29 tuning flow chart 3

## 5.2 Audio Index Test Item

to some extent, objective index parameters can reflect the status of speakers of listening, and audio indicator also reflect the level of speakers prototype hardware platform, and then determines the sound level directly after bring in ASET.

### 5.2.1 Audio Index Description

Generally speaking, there are a lot of audio indicators for a speaker, but for tuning, it is

necessary to ensure that the basic indicators satisfy SPEC. Audio indicators include electrical signals and acoustic signals.

## 5.2.2 Audio Index Test of Electrical Signal

### 1. Maximum Output Power

Maximum output power determines the maximum loudness of the prototype sound, and it is usually drawn up according to the product SPEC, such as product specification requirements: maximum output power  $2 \times 5 \text{ W} @ 4 \Omega$ , that each track maximum power output is 5 W.

### 2. THD+N

THD+N indicates the ability of the entire speaker system to restore the signal. Usually, it is also formulated according to the product SPEC, such as the product specification:  $\text{THD+N} \leq 0.2\% @ 1 \text{ W} @ 4 \Omega$ , indicating that THD+N is less than 0.2% when the output is 1W and the load is  $4 \Omega$ . In general, for the maximum output power, THD+N is less than 1%, otherwise the ASET sound effect can be easily produced, especially the heavy bass.

### 3. Frequency Response Curve

The frequency response curve refers to the amplitude test of each frequency point in the audio frequency band. The general frequency response curve is a flat; But in order to satisfy the demand of different consumer, tuner can change a particular frequency of different changes, in order to make balance spectrum and compensate for the speaker, user also can put some frequency points increase or decrease.

### 4. THD+N Curve

THD+N curve refers to the test of THD+N value of each frequency point in the audio frequency band. The test curve will be increased while testing the maximum output power and frequency response curve. A good prototype requires no more than 1% of THD+N value in the frequency range. If there is a deviation from the larger value, it is necessary to make the single sound file of this frequency point to test its FFT and then analyze it.

### 5. Sensitivity Curve

The output power changes as the input becomes larger (the LINEIN is usually 10mV to 950mV). It can be seen from the sensitivity curve that are the sensitivity and limited power etc.

## 5.2.3 Acoustics Index Test

### 1. Sound Frequency Response Curve

The curve reflects the characteristics of the sound features from the electric signal through the speaker and the cavity.

### 2. Impedance Curve of Speaker & Cavity

This curve reflects the physical properties the speaker and cavity , user can see from the curve, the resonance frequency of the speaker  $F_0$ , the lower limit of the frequency is the bass replay system, the lower  $F_0$ , the better system shows bass replay;

Cavity resonant frequency  $F_1$ ; The Q value of the speaker indicates the damping state of the vibration system (that is the speed of the vibration attenuation) and the resonance sharpness, the vibration is quickly stopped when the Q value is low, and the vibration is not easy to stop when Q value is high.

When the Q value is too low, the low frequency part of music will attenuate too much, and the sound will not be as powerful as the bass.

When the Q value is too high, the low frequency part of music is over strengthened, and the resonance sound is longer and a little fuzzy.

批注 [z1]: 震动衰减

批注 [z2]: 共振锐度

## 5.3 Tuning Process

The tuning process is divided into hardware debugging and ASET sound debugging. The steps are as follows:

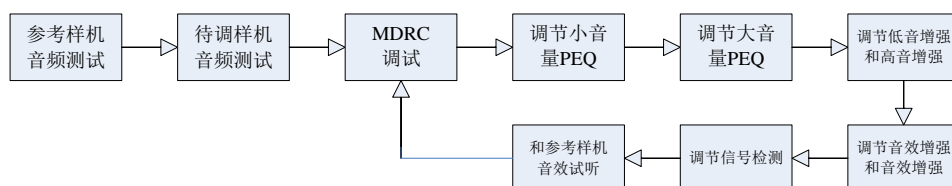


Fig 30 tuning flow chart4

## 5.3.1 Sound Index Test of Sample Speaker

If reference prototype can be disassembled, that it is best to disassemble and test reference prototype electrical signals: EQ and THD + N curve at small volume, EQ and THD + N curve at medium volume, EQ and THD + N curve at large volume, the sensitivity curve at large volume (if reference prototype has the sensitivity function).

1. EQ and THD + N curve at small volume,
2. EQ and THD + N curve at medium volume,
3. EQ and THD + N curve at large volume as follows:

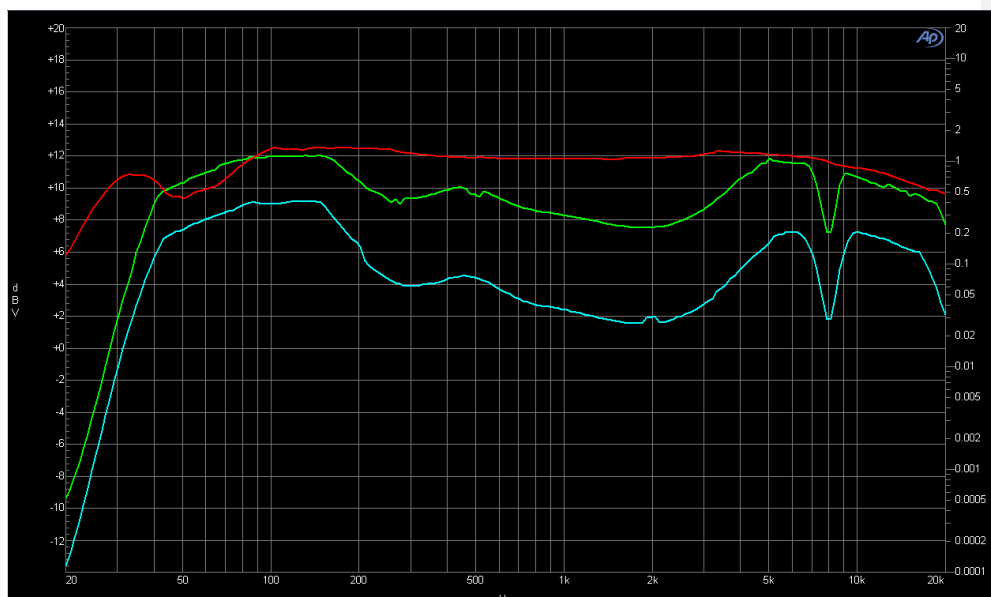


Fig 31 electronic PEQ curve

批注 [z3]: 电 PEQ

4. the sensitivity curve at large volume:

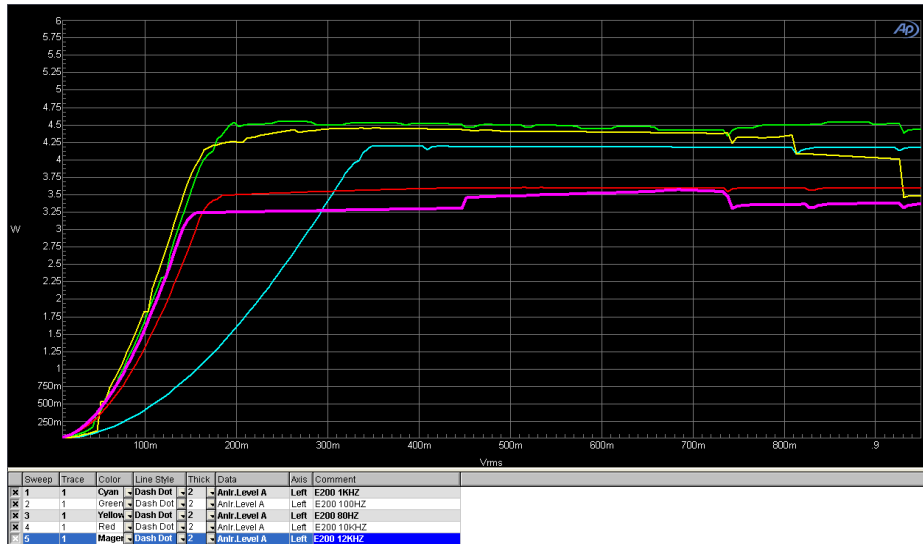


Fig 32 sensitivity curve test

If the sample prototype can not be disassembled, user has to test the sound frequency of the whole machine: sound frequency response curve at small volume, sound frequency response curve at middle volume, sound frequency response curve at large volume.

1. sound frequency response curve at small volume,
2. sound frequency response curve at middle volume,
3. sound frequency response curve at large volume, as follows:

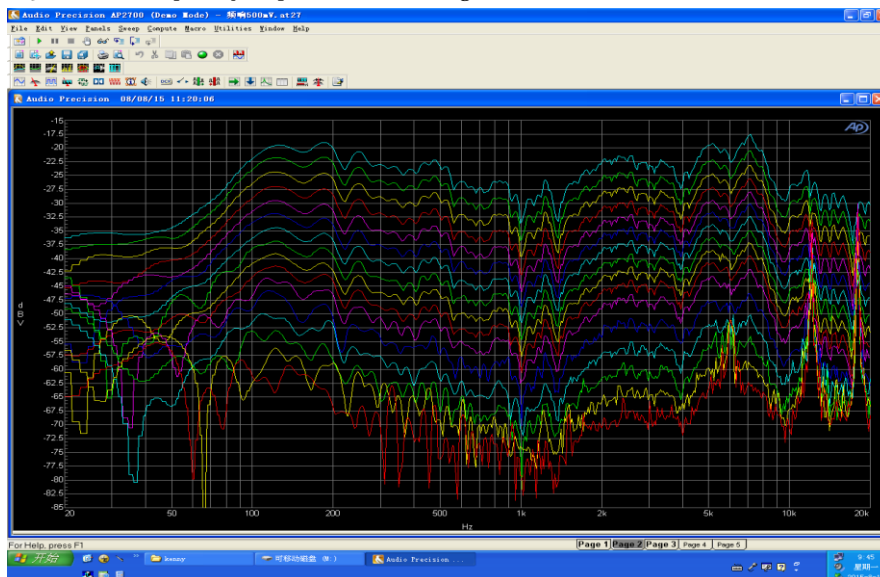


Fig 33 sound frequency response curve test

### 5.3.2 sound test of the sample prototype

In order to ensure that the hardware platform of audio index, you first need to test index with closing ASET, now need to test the maximum output power of the prototype of a machine, and require the maximum output power at THD + N to less than 1% (for high quality demanding customers THD + N within 0.5%; the not that high sound quality , customer THD + N could be within 5%).

#### a) smart DRC adjustment test

After the MDRC and Limiter are opened by the ASET tool, the other modules should not be opened, and the "equivalent pre-attenuation" of the PEQ page should be set to 0dB; If the maximum value of PEQ frequency point is  $A_0$ , then preattenuation Precut is set to  $-A_0\text{dB}$  to test the power output curve of MDRC.

1. First, the MDRC's **crossover point** is set. By default, the crossover point is set to 125HZ and 6KHZ, which can be adjusted according to the following listening sound.
2. Adjust the parameter "with Limiter difference", and the default value of 1.5dB can be used when testing the index; The latter can be adjusted according to the listening. Generally, the smaller the parameter, the more **sound thorough**, but the more DRC is compressed; The larger the parameter, the more stable the sound.
3. Adjust the MDRC parameters of the frequency band (**at this time, the MDRC threshold of low frequency band and high frequency band should be set to the same as the middle frequency band**); The sensitivity of MDRC is set by adjusting the threshold of "MDRC", such as setting the sensitivity to 350mV; Adjust the output power by adjusting the **"power trimming"** and "signal attenuation", such as setting the limiting power output to 5W.
4. Set the MDRC parameter of low frequency band, and set the limit output power of low frequency band by adjusting the "MDRC threshold".
5. Set the MDRC parameter of high frequency band and set the limit output power of high frequency band by adjusting the "MDRC threshold".

批注 [z4]: 声音通透性

批注 [z5]: 功率微调

## b) standard DRC adjustment test

The standard DRC process is easy to adjust, understand and suitable for experienced tuners. Since the standard DRC supports different sound parameters at each volume level, after adjusting the parameters of the maximum volume, it is necessary to adjust the volume parameters at all other levels. At all levels, there are "\*" labels before the parameter names that can be adjusted. The parameters are:

1. Pre-attenuation;
2. The compressor threshold 1, threshold 2, and the compression ratio 1,2 the compressor;
3. Signal fine tuning, gain compensation;
4. Compensation filter threshold;
5. The threshold value 1 of DRC, threshold 2, compression ratio 1, compression ratio 2.

批注 [z6]: 压缩器

批注 [z7]: 压缩比

PS: When adjusting the volume parameters at all levels, the AUX mode and the non-aux mode are also required, and the volume adjustment button in the lower right corner of the tool should be set to the corresponding volume level.

## c) Adjust the PEQ curve within small volume

Reference the PEQ curve within the small volume of the sample prototype is import ASET tools as a reference curve, and then by adjusting the PEQ point of equalizer page, set different frequency, gain, Q value, filter type, and other parameters, such as to achieve the same curve and reference prototype. Then testing by AP if achieve the same curves as the sample prototype at a small volume.

批注 [z8]: 参考样机

## d) Adjust the PEQ curve within large volume

Under the high volume when the MDRC, theoretically PEQ curve will be a flat, if you want to come out some frequency points, you can put the PEQ point under POSTEQ state. again with the AP test, tuner will find PEQ attenuation at this point, to meet the requirements of listening.

批注 [z9]: 大音量

批注 [z10]: 衰掉频点不知道怎么个意思

## e) Adjust enhancement of bass and high pitch

Under the small volume or high volume, if through the PEQ to adjust to the bass effect and high effect is not satisfied, you can adjust the bass boost and high pitch enhancement algorithm to achieve a more satisfactory result. Of course, the result of regulation cannot be broken.

#### f) Sound effect enhancement and reduction

After adjusting the output power and EQ curve, we can modify the hearing sense of small power and high power. When the output power is small, we can fine-tune the EQ, for example, the low-frequency EQ gain can be raised to make the low frequency of the small volume stronger;

批注 [z11]: 听感

批注 [z12]: 微调

When the output power is very high, it will be easy to produce the problems such as breaking sound and distortion. At this time, we can reduce some of the EQ point gain, so that there is no breaking sound in the high volume.

#### g) Signal detection module

If the tuner wants to have a better effect under AUXIN, you can open the module using the default parameter.

#### h) Audition online

After adjusting the above modules, the tuner can hearing the effect online, and if the listening does not meet your requirements, you can return the above parameters. If OK, you should save the ASET parameters; In the case of the standard DRC mode, you need to adjust the parameters at each volume level.。

#### i) Package fw

After listening to OK online, you need to export the ASET parameter to \*.txt file, then package it to the firmware, and then upgrade to the prototype, and finally you can audition the confirmation effect.

批注 [z13]: 样机

## 5.4 Audition Tips

After the above sound debugging is completed, or sometimes need the tuner to debug and listen;The quality of sound quality is very subjective, and the quality of sound quality



varies from person to person. Different people have different tastes; Different music reflects different listening senses as well.

## 5.4.1 Audition environment

In order to the correctness of the hear feeling, it is better to choose the listening room or quiet environment to reduce the noise interference. Because different people may feel different, especially for some differences in the emotional color of the prototype, especially so. But for most professional tuners, the consensus is better.

## 5.4.2 basic judge of sound

Generally speaking, a good speaker should have the following feel:

- low frequency shows subduction and not dry, dynamic sense, and no sound broken;
- The human voice of the middle frequency should be bright and penetrating, without nasal and dental sound, and a wide vocal field is needed also;
- High frequency is not harsh, audition comfortable.

批注 [z14]: 低频下潜

批注 [z15]: 动态感

批注 [z16]: 透亮

批注 [z17]: 齿音

批注 [z18]: 耐听翻译为听着舒服

## 5.4.3 audition songs

audition song generally requires the format MP3 or Wav which bittate is at least 320kbps; That makes the difference in detail more audible. Then different frequency bands and different emotional colors need to listen to different songs. And the high pitch usually USES a soprano or violin song; The middle tone is usually a baritone singer's song, and the bass is a drum beat or a bass song. At present, the commonly used auditions are shown in the following table.:

批注 [z19]: 试听歌曲

批注 [z20]: 感情色彩

批注 [z21]: 女高音

批注 [z22]: 男中音

aspect	Audition songs				
Low frequency	Burn	渡口	鼓诗	Abracadabra	加州旅馆
Voice middle frequency	船歌	匆匆那年	恰似你的温柔	北京北京	Way down deep
Voice high frequency	Angle	Hello	Turning Tables	青藏高原	天堂
Piano music	街道的寂寞	夜的钢琴曲	风继续吹	有谁共鸣	只怕不再遇上
Sound break easy	渡口	Angle	Hello	Strobe	恰似你的温柔

## 5.4.4 APP For Simple Frequency Response

When tuning at the factory, where has no AP and acoustic test instrument, a simple Signal generator APP can be installed on mobile phones, for example, Iphone can install software "Signal Gen", this software can generate 20 hz - 20 KHZ audio sine wave Signal.

At this time for the reference prototype and the sample prototype can play the same frequency tone, listen the difference, if inconsistent, the PEQ point's amplitude and Q value should be adjusted. They usually select 30HZ, 40HZ, 50HZ, 60HZ, 80HZ, 100HZ, 150HZ, 200HZ, 300HZ, 400HZ, 500HZ, 800HZ, 1KHZ, 2KHZ, 3KHZ, 4KHZ, 5KHZ, 6KHZ, 7KHZ, 8KHZ, 9KHZ, 10KHZ, 12KHZ, 14KHZ, 16KHZ, 20KHZ etc.

批注 [z23]: 声学实验仪器

批注 [z24]: 指的参考样机

批注 [z25]: 幅度

## 5.4.5 Subjective Audition Description

At present, most of the auditions are mainly subjective language. For subjective evaluation of sound quality, some professional audio experts identified some attributes and parameters to describe the sound subjective, and the parameters of the adjectives are subjective evaluation and common terms, such as the fullness of the term is plump, dry, etc. The emotional color of sound is described by "soft", "warm" and "hard". There are also some frequency related listening descriptions.

批注 [z26]: 主观评价

批注 [z27]: 丰满的

批注 [z28]: 听感描述

### 1. Frequency related

批注 [z29]: 与频率有关的主观描述  
没有直译，就是这样表达也能说明那个意思，如果直译有些太啰嗦了

Frequency band	Audition description	Instrument instance
20—60HZ	This frequency affects the spatial sense of timbre, which is mostly above the frequency. This frequency is the resonant frequency of rooms or halls. This frequency is very difficult to perform, and in some hi-fi systems, the frequency is cut off to ensure the consistency and audibility of the tone.	explosive、Disco
60—100HZ	This frequency affects the rich of sound, which is the base of the bass. If the frequency is very plump, the tone will appear thick and thick; If this	Large drums, timpani, and piano,

批注 [张30]: 音色的空间感

批注 [z31]: 声音浑厚感

	frequency is insufficient, the tone will become weak;And if this frequency is too strong, the sound will have low frequency resonant sound, and there will be a <b>roar</b> .	cello, tuba, etc., which have extremely low frequency.
100—300HZ	<p>This frequency affects the <b>intensity of the sound</b>, especially the male voice.In the 80-160hz band, the sound of music is mainly reflected in the <b>thick and solid</b> of music.</p> <p>In this part, if the sound of the acoustics is good, and it will feel that music is <b>thick and strong</b>.If the performance is not good, the concert is <b>dull</b>, even weak.It is the upper limit of the playback of many <b>subwoofers</b></p>	male voice
300—500HZ	The frequencies of sound is primarily vocal performance (singing and recitation), the frequencies of sound are mainly used for the <b>thickness of the vocal performance and strength</b> , if the band business is good, the voices will be more <b>bright, clear</b> , otherwise life is reflected more <b>thin, cloudy</b> .	Human Voice, part percussion instrument
800HZ	This frequency range affects the <b>intensity of tone</b> .If the frequency is full, the tone will be strong;If this frequency is insufficient, the timbre will appear to be <b>relaxed</b> , which means that if the component characteristics below 800Hz are prominent, the low-frequency components are obvious.If this frequency is too much, it will produce a <b>throat sensation</b> .If the larynx is too much, it will lose the personality of the voice, it is worth noting that the proper larynx can increase the <b>sex appeal</b> .	
1KHZ	This frequency is the <b>standard reference frequency</b> for the sound equipment test. The parameters usually given in the audio equipment are tested under 1kHz. And this is the most sensitive frequency in the human ear.	
1.2KHZ	This frequency can be a bit more appropriate (not more than 3dB), which can improve the brightness of the sound.Too much is bad, because it makes the <b>sound hard</b> .	
2—4KHZ	If the frequency component is too small, the auditory capacity will be poor and the speech will be <b>blurred</b> ;If the frequency component is too strong, it will produce a <b>cough</b> .Affected by the sense of depth of the spectrum of music at the same time, with the proper ascension can improve the <b>brightness and clarity</b> of sound, but can't have too many outstanding when 4 KHZ, or female voice may show toothed.	Some female voices, and most of the wind instruments
4—8KHZ	This frequency most affects the <b>articulation, brightness</b> , if this frequency component lacks, the tone color becomes <b>general</b> ;If the frequency component is too high, the tone becomes <b>sharper</b> and the human voice	Some female voices, and most of the wind instruments..

批注 [z32]: 厚实感

批注 [z33]: 厚实有底气

批注 [z34]: 沉闷

批注 [z35]: 低音炮

批注 [z36]: 浑浊

批注 [z37]: 音色的力度

批注 [z38]: 松弛

批注 [z39]: 喉音感

批注 [z40]: 性感 吸引力

	may appear <b>toothed</b> .	
8—12KHZ	<p>This frequency band is the high range of music, which is the most sensitive to the high frequency performance of sound.</p> <p>Appropriately protruding (5dB below) has great help to the <b>level and color</b> of the acoustics, also can make the person feel <b>rich high-pitched</b>. However, too many words can make a person feel the <b>keen-edged and scare</b>.</p> <p>If this is lacking, the voice will be lacking in appeal and <b>vitality</b>.</p>	Flute, oboe, trumpet, flute and other high-pitched wind instruments.
12—16KHZ	<p>This frequency can affect the overall <b>color sense</b>, it can cause the instrument to lose <b>personality</b> if this frequency is too dim . and if it is too much, there will produce the <b>burr feeling</b>.</p>	Cymbal, bell, bell drum, sand hammer ,triangle iron and other percussion instruments of high frequency overtones.
16—20KHZ	<p>may be a lot of people can't hear this frequency, but actually it can affect the <b>brightness of the high frequency</b>, the frequency and the <b>dimensional feeling of whole</b>. too little frequency can let a person feel a bit boring, too much will produce <b>rootless</b> feeling, prone to <b>auditory fatigue</b>.</p>	The overtone of electronic sound, guzheng piano and other instruments.

## 2. Description Of Subjective Psychological Emotion

item	Subjective description	detail
articulation	Clearness, <b>fuzzy</b> , turbid	The program is well understood, and the band has a clear hierarchy and a clear sense of bottom.
balance	banlance, imbalance	The parts of the program are proportionally coordinated, stereo left and right sound track are consistent and sound like normal.
richness	Rich, thin, <b>wizened</b>	Medium bass full, high pitch moderate, loudness appropriate, warm, comfortable, elastic.
<b>Intensity</b>	Powerful, weak	The sound is solid and powerful and it can reflect the original dynamic sound source.
Mellow sence	Mellow & full, lustrous, <b>pointed</b>	Beautiful, lustrous but not pointed, mainly used to evaluate vocals and some Musical Instruments.
brightness	bright, gloomy	Hight and middle volume is sufficient and sounds clear
<b>softness</b>	solft, harsh	The sound is not tight, the high pitch is not harsh, and it is pleasant to hear.

批注 [z41]: 模糊的

批注 [z42]: 干瘪的

批注 [z43]: 尖锐的

Fusion sence	fusion, loose	The whole sound blends together and feels good.
sense of reality	real, anamorphose	Sounds real. <b>anamorphose</b> : sound breaking, frying, dyeing, etc.
Immediacy sence	Immediacy	The sound of re-release makes a person feel "in the atmosphere".
Stereoscopic sence	Width & depth, thin	Sound has a sense of space, not only sound like azimuth matrix accurate, sound image group distribution is correct, but also have width and depth.

批注 [z44]: 声音失真

## 5.4.6 audition & frequency band

Generally speaking, tuner will adjust the frequency band according to music quality they hear. Tuner also can get the corresponding sence when various frequency composition is too high or too low. the adjustment of the general rules are as follows:

Frequency band	instance	Too low	moderation	Too high	brief
20Hz-60Hz	31Hz	Hollow	Nice sence of space	low frequency resonant sound shows the "hum" sound.	Sence of space
60Hz-100Hz	62Hz	<b>Lack strength</b>	<b>deep</b> and vigorous	low frequency resonant sound shows the "boom" sound	depth
100Hz-150Hz	125Hz	Thin	High richness and little tuibrid	Heavy tuibrid with "humh"	richness
150Hz-300Hz	250Hz	Too weak	strngthfull	<b>harsh</b>	Strength
300Hz-500Hz	500Hz	empty	powerful	Telephone voice sence	
500Hz-1KHz		Shrink	Nice sound outline	sound bulged forward	guttural sound
800Hz		loose	strength	Guttural, nasal	nasal
1-2KHz	1KHz	tone disjoint	High transparency	<b>Bouncing</b>	transpar
2-3KHz	2KHz	hazy	bright	<b>stiffness</b>	brightne
4KHz	4KHz	Fuzzy	Nice voice through	cough	
4-5KHz		Outlying sound sourse	Nice sensitivity	Voise closer	forward
5-6KHz		ambiguity	Clear sound	sharp	
6-8KHz		dim	transparency	Heavy toothed	

批注 [z45]: 无力的

批注 [z46]: 浑厚感强烈

批注 [z47]: 生硬的

批注 [z48]: 跳跃感

批注 [z49]: 呆板的

8-10KHz	8KHz	insipid	Clear sound S and nice transparent	pointed	S sound	批注 [z50]: 平淡无味的
10-12KHz	16KHz	tarnish	Strong metallic sound	Sharp noise		批注 [z51]: 没有光泽的
12-16KHz		Non-clolors	colorful	pointed	metal	
16-20KHz		Lost charm, clolor and tonal expression	Jaw bone conduction feelling and sounds quality	Universe and instability sence		

## 6. Package Firmware

### Process for Sound Parameters

1. After debugging the sound parameters, it is necessary to export the sound parameters to the TXT format file through the corresponding button .

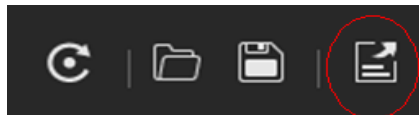


Fig 34 button for extract the para configuration

2. Open the Media Firmware Modify Tool and select the path to Modify, as shown in the figure below.

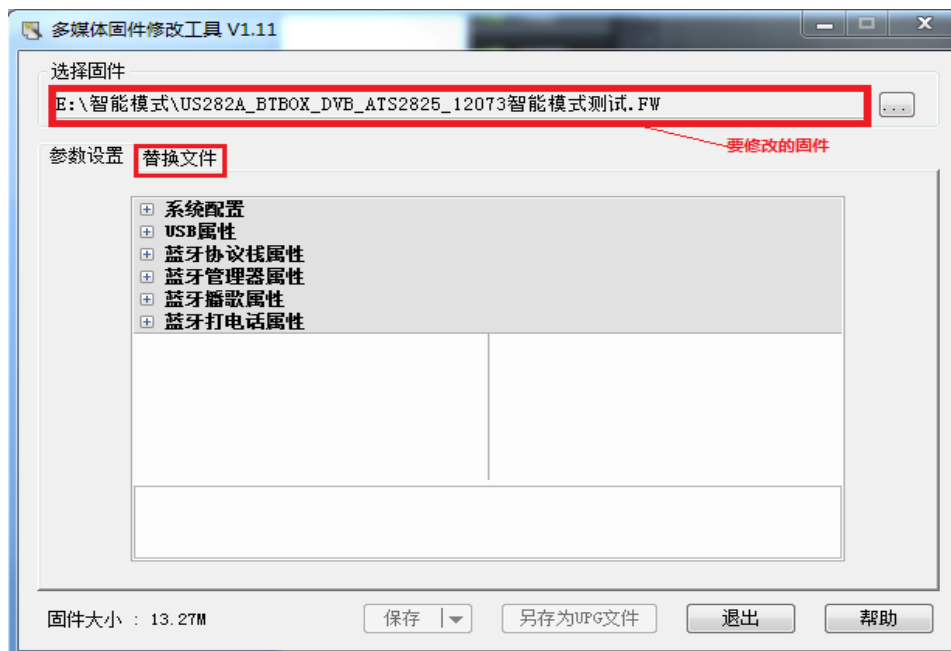


Fig 35 Firmware Modify Tool

- Click the replacement file to get the image below:

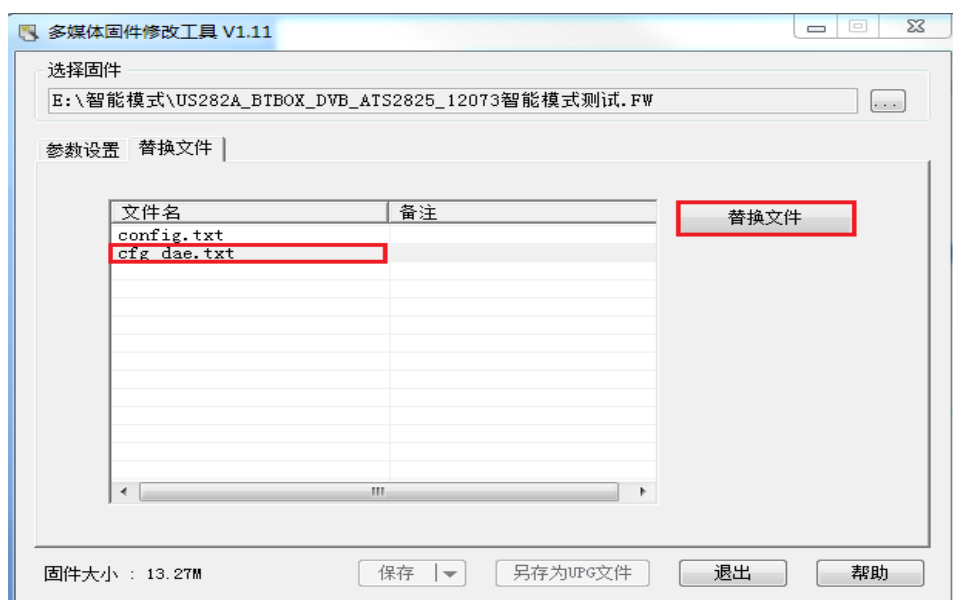


Fig 36 replacement file

- Select `cfg_ASET.txt`, and then select the replacement file `actions_ASET.txt`, then will pop up the following dialog box.



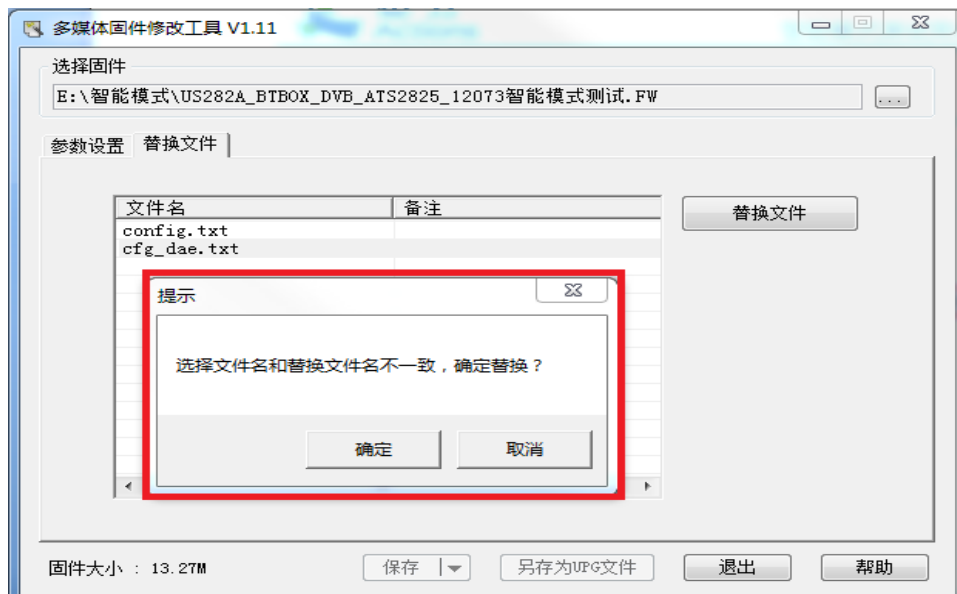


Fig 37 replace dialogue

- Click ok and save to generate a new xxxxxxxx.fw firmware, which contains the new sound parameters.

## 7. Key Words

- [限幅器](#) limiter; limitator; limitr
- [信号溢出](#) signal overflow
- [超标](#) overproof
- [阈值](#) threshold; threshold value
- [输出功率](#) output power
- [启动时间](#) startup time
- [释放时间](#) release time
- [开启](#) open; unlock; turn on; unseal
- [关闭时间](#) turn-off time
- [长短](#) length; accident; mishap; right and wrong
- 分频点 : crossover point

- 声频响 : sound frequency response
- 音频指标: audio index
- 调音师: tunner
- Limiter 差值: Limiter difference

## 8. Declaration

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