ASET Tuner Manual

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2018-02-28	V1.0	V3.1.6	正式发布版本。	Kenny

1. Catalog

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 effeciently in real time with it.

ASET offers friendly UI and support adjusting online, and it is quiet convinent.

3.2 Algorithm features

1. Up to 20 EQ setting and each EQ point 'parameters could be adjust 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 include 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:

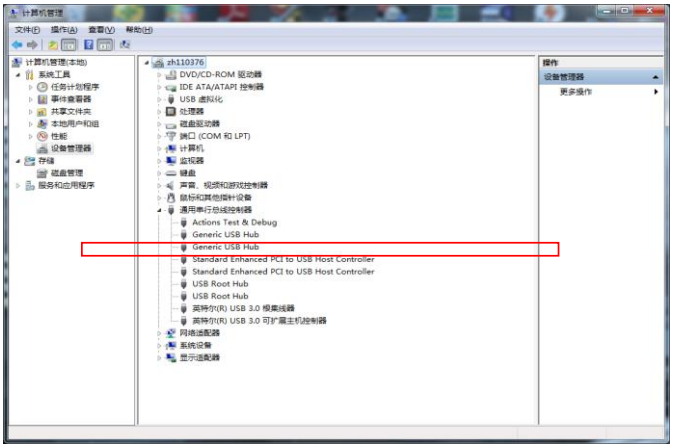


Fig 2 ATD device

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：

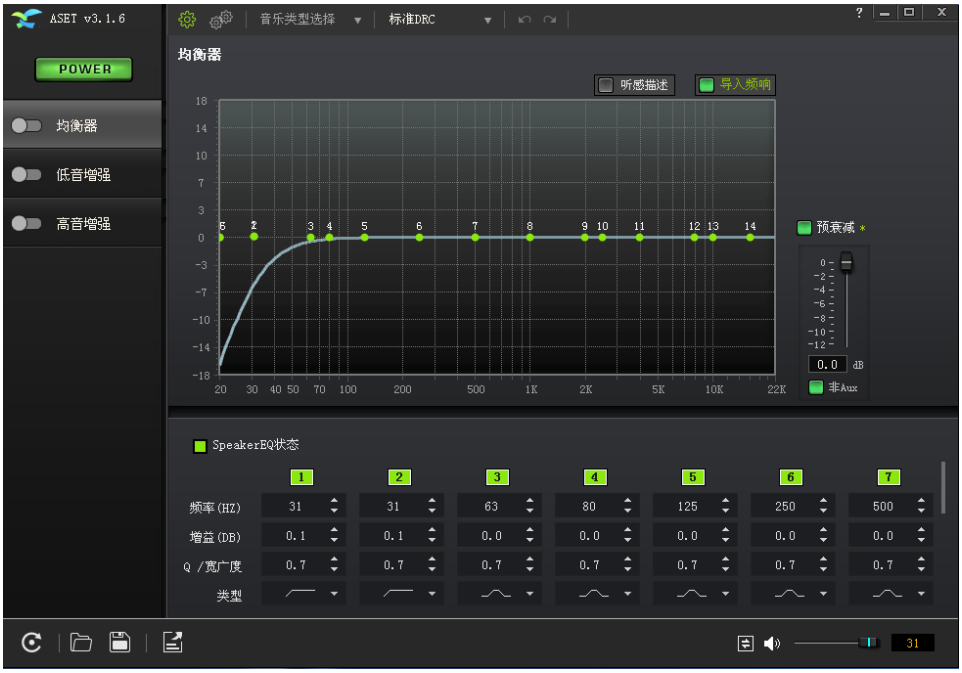


Fig 4 ASET interface

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.

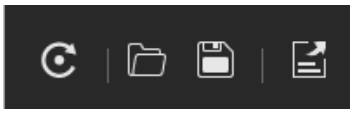


Fig 5 common functions interface

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

3. 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

4. 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

5. 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.

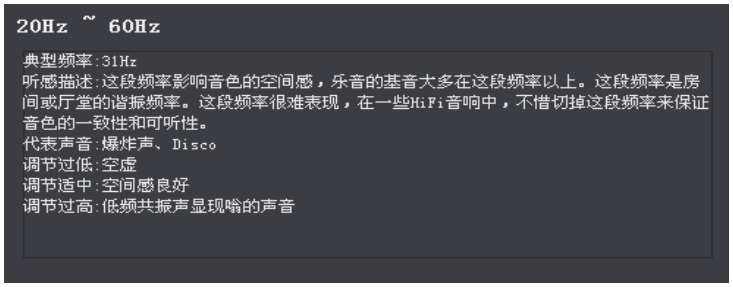


Fig 11 sense description

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

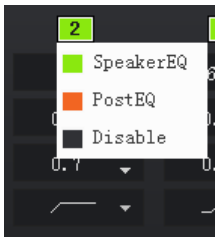


Fig 14 PEQ type setting

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.

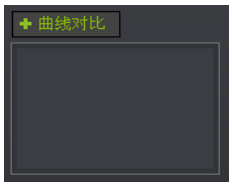


Fig 15 Curve contrast

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.

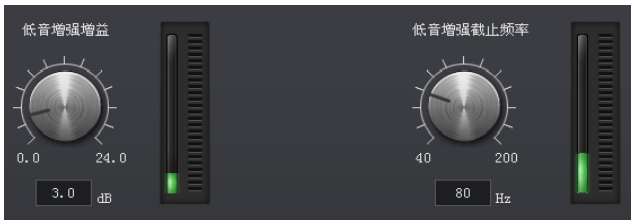


Fig 16 bass enhancement interface

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.

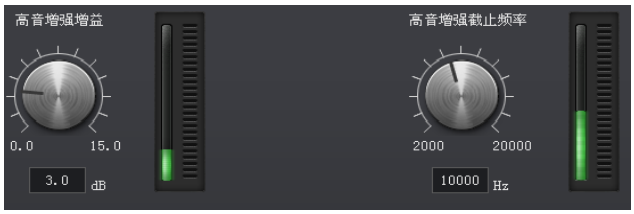


Fig 17 high pitch enhancement interface

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

2. 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**
  1. Power fine tuning: slight adjustments to the final output signal, such as balancing the input size of different signal sources
  2. Signal attenuation: the output power of fine adjustment, such as the balance of output power of different signal sources, etc.
  3. 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.

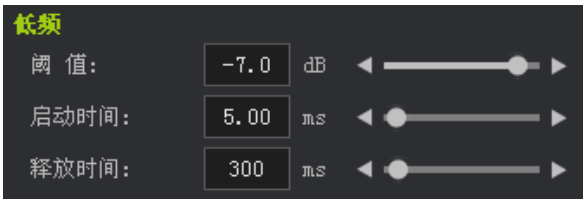


Fig 21 smart DRC parameter setting 2

- **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) = 2dB.

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.

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.

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 odB ~ -80db, and the default is -60db.

Fig 26 signal detection page

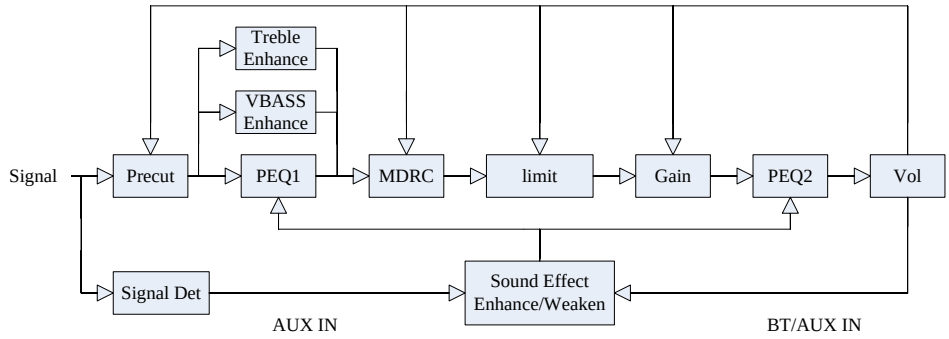
5. Sound Debugging Method

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 tunner should adjust different parameters according to different sound effects process in order to get the best sound effect.

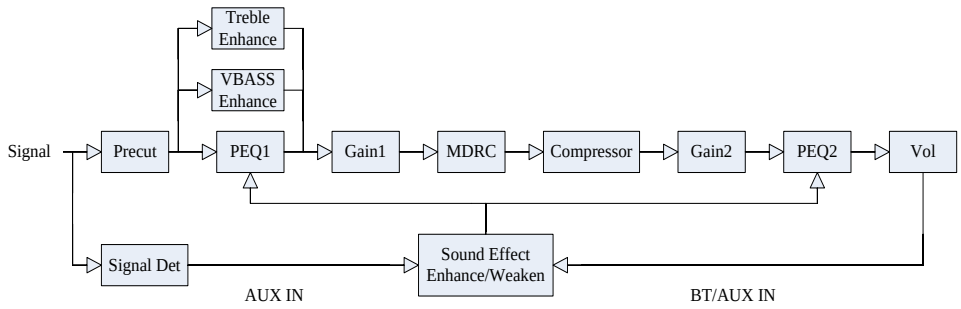
5.1.1 ASET sound flow chart in smart mode

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.

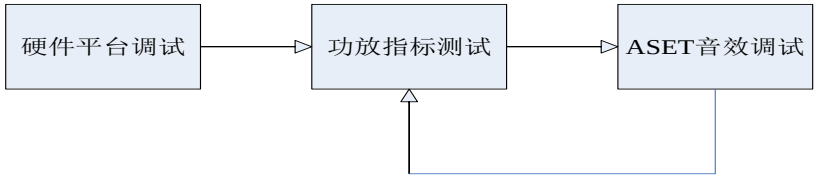


Fig 27 tuning flow chart 1

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.。

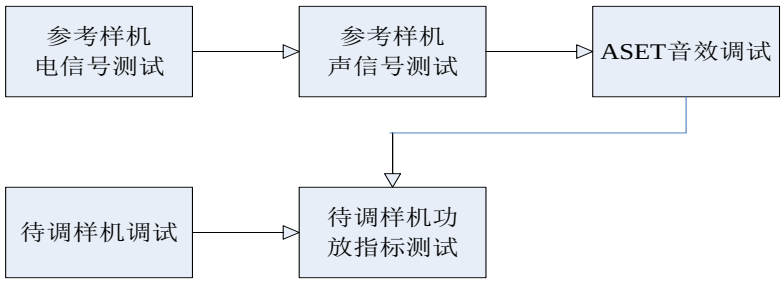


Fig 28 tuning flow chart 2

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.

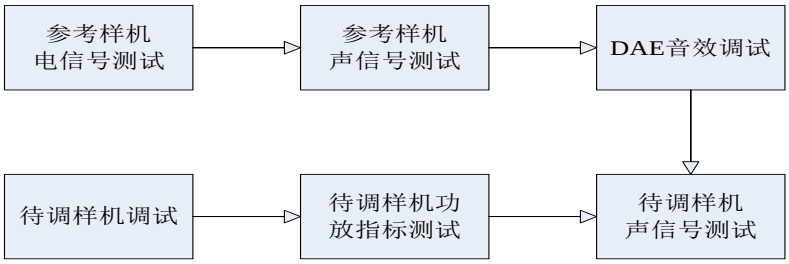


Fig 29 tuning flow chart 3

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 x 5 w @ 4Ω, 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: THD+N ≤ 0.2@1w @4Ω, indicating that THD+N is less than 0.2% when the output is 1W and the load is 4Ω. 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, tunner 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 Fo, the lower limit of the frequency is the bass replay system, the lower Fo, the better system shows bass replay;

Cavity resonant frequency F1; 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.

批注 [z1]: 震动衰减

批注 [z2]: 共振锐度

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.

5.3 Tunning Process

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

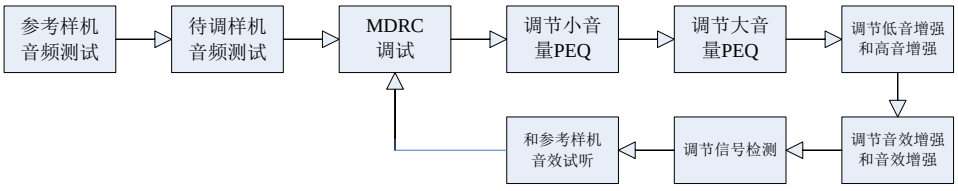


Fig 30 tunning flow chart4

5.3.1 Sound Index Test of Sample Speaker

If reference prototype can 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：

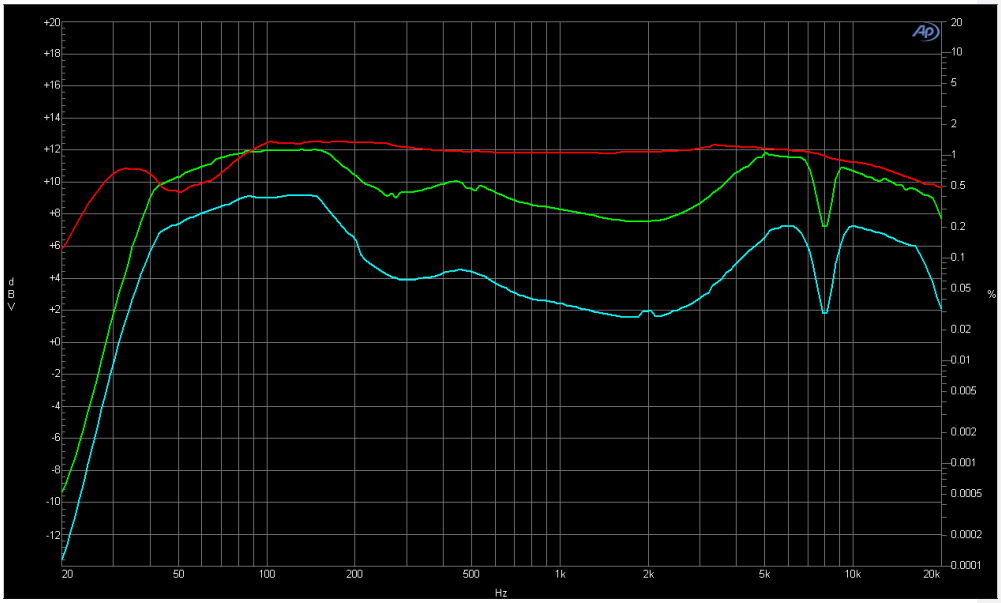


Fig 31 electronic PEQ curve

批注 [z3]: 电 PEQ

4. the sensitivity curve at large volume:

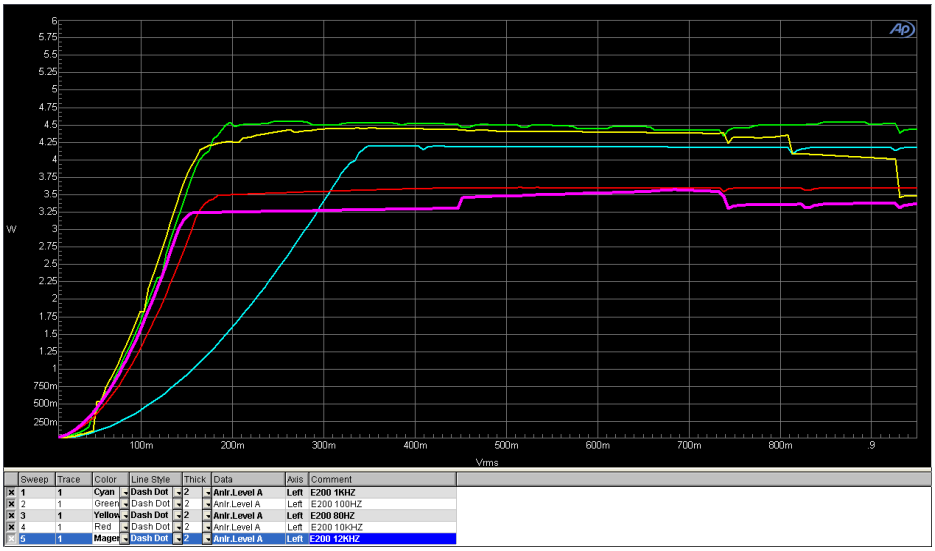


Fig 32　sensitivity curve test

If the sample prototype can nor be disassembled，user has to test the sound frequency of the whole machine: sound frequency response curve at amall volume，sound frequency response curve at middle volume, sound frequency response curve at large volume.

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

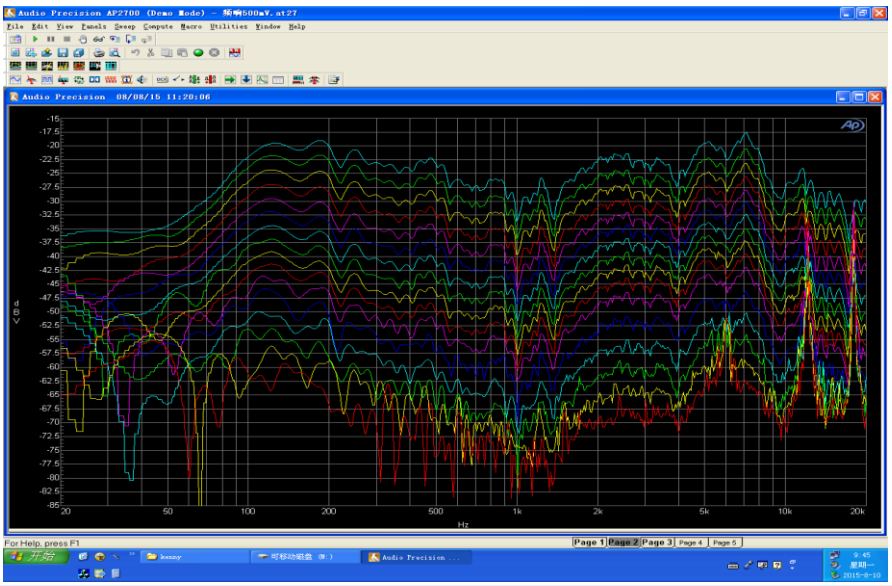


Fig 33 sound frequency response curve test

5.3.2 待调样机音频测试

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%).

一. 智能 MDRC 调节测试

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 odB; If the maximum value of PEQ frequency point is Ao, then preattenuation Precut is set to -Aodb 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

二. 标准 DRC 调节测试

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.

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.

批注 [z6]: 压缩器

批注 [z7]: 压缩比

三. 调节小音量时的 PEQ 曲线

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 reference machine at a small volume.。

批注 [z8]: 参考样机

四. 调节大音量时的 PEQ 曲线

大音量下，当 MDRC 起作用时，理论上 PEQ 曲线会是一条平直的曲线，如果想要衰掉某个频点，则可以把 PEQ 点的状态设置成 POSTEQ 状态，再次用 AP 测试时会发现，曲线在大音量时把该点的 PEQ 衰减了一部分，从而达到满足听感的要求。

五. 调节低音增强和高音增强

在小音量或大音量下，如果通过 PEQ 调节到的低音效果和高音效果不满意，则可以通过调节低音增强和高音增强算法来达到更满意的低音和高音效果；当然调节的结果是不能有破音。

六. 调节音效增强和音效减弱

在调试好输出功率和 EQ 曲线后，我们可以对小功率时和大功率时的听感进行修正；当输出功率较小时，可以微调 EQ，比如可以把低频 EQ 增益调大，让小音量的低频更强些；

当输出功率很大时，会容易产生破音和失真等问题，此时可以把某些 EQ 点增益降低些，让大音量下不至于破音。

七. 调节信号检测模块

如果想要在 AUXIN 下有更好的效果，则可以打开此模块，使用默认的参数即可。

八. 在线试听

在调节好以上模块后，可以在线试听，如果听感不满足，再返回调节以上参数。如果 OK，则保存好 ASET 参数；如果是标准 DRC 模式，还需要再调节各音量等级下的参数。

九. 打包固件试听

在线试听 OK 后，将 ASET 参数导成 *.txt 文件，打包到固件，然后升级到小机，就可以试听确认了。

5.4 音乐试听技巧

以上各项音效调试完成后，或有时需要边调试边试听；音质试听主观性比较强，音质的好坏大都因人而异；不同的人有不同的喜好程度；不同的音乐反映的听感也不一样。

5.4.1 试听环境

为了试听感受的正确性，最好在试听房或安静的环境下试听，以减少外界的的噪声干扰。因为不同的人可能感受不一样，特别是对于一些差异在感情色彩方面的样机，特别要如此。但对于大多数专业的调音师，得出的结论一致性会比较好。

5.4.2 好音质的基本判别

一般而言，好的音箱应具有如下的听感：低频下潜要好，有一定的低频动态感，低频不

干涩，不破音；中频人声要明亮透彻，无鼻音及齿音，人声声场宽阔；高频不刺耳，耐听。

5.4.3 试听歌曲

试听歌曲一般要求 320kbps 比特率以上的 MP3 或 Wav；这样更能听出细节上的差异。不同的频段及不同的感情色彩需要试听不同的歌曲。高音一般使用高音女声或小提琴类的歌曲；中音一般是男中音歌手的歌曲，低音则是打鼓声或低音歌唱家的歌曲。目前常用的试听曲子如下表所示：

试听项	试听歌曲				
低频	Burn	渡口	鼓诗	Abracadabra	加州旅馆
人声中频	船歌	匆匆那年	恰似你的温柔	北京北京	Way down deep
人声高频	Angle	Hello	Turning Tables	青藏高原	天堂
钢琴曲	街道的寂寞	夜的钢琴曲	风继续吹	有谁共鸣	只怕不再遇上
容易破音的歌曲	渡口	Angle	Hello	Strobe	恰似你的温柔

5.4.4 简单频响测试 APP

当在工厂现场调音，而没有 AP 和声学测试仪器时，可以在手机上安装一个简单的信号发生器 APP，Iphone 手机可以安装“Signal Gen”软件，此软件可以产生 20Hz-20KHz 的音频正弦波信号。此时待调样机和参考样机可以播放相同频率的单音，试听待调样机的单频响度是否和参考样机的一致，如果不一致，而需要在 PEQ 上把该点的幅度和 Q 值做修改。一般会听 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 等频点。

5.4.5 听感主观描述

目前音质的试听大都以主观语言感情描述为主。为了进行音质的主观评测，一些专业的音频专家确定了一些最能描述声音主观属性和参量，以及参量的形容词作为主观评价和常用术语，如丰满度的术语是丰满，干瘪等；声音的感情色彩用“柔和”，“暖”，“硬”等描述；此外还有一些和频率有关的听感描述。

1. 和频率有关的主观描述

频率段	听感描述	代表的乐器
20－60HZ	这段频率影响音色的空间感，乐音的基音大多在这段频率以上。这段频率是房间或厅堂的谐振频率。这段频率很难表现，在一些 HiFi 音响中，不惜切掉这段频率来保证音色的一致性和可听性。	爆炸声、Disco
60－100HZ	这段频率影响声音的混厚感，是低音的基音区。如果这段频率很丰满，音色会显得厚实、混厚感强；如果这段频率不足，音色会变得无力；而如果这段频率过强，音色会出现低频共振声，有轰鸣声的感觉。	大鼓、定音鼓，还有钢琴、大提琴、大号等少数存在极低频率的乐器。
100－300HZ	这段频率影响声音的力度，尤其是男声声音的力度。在 80－160Hz 频段的声音主要表现音乐的厚实感，音响在这部分重放效果好的话，会感到音乐厚实、有底气；如果表现不好，音乐会有沉闷感，甚至是有气无力。是许多低音炮音箱的重放上限。	男声
300－500HZ	这个频段的声音主要是表现人声的（唱歌、朗诵），这个频段上可以表现人声的厚度和力度，好则人声明亮、清晰，否则单薄、混浊。	人声、部分打击乐器
800HZ	这个频率幅度影响音色的力度。如果这个频率丰满，音色会显得强劲有力；如果这个频率不足，音色将会显得松弛，也就是 800Hz 以下的成分特性表现突出了，低频成分就明显；而如果这个频率过多了，则会产生喉音感。如果喉音过多了，则会失掉语音的个性，适当的喉音则可以增加性感。	
1KHZ	这个频率是音响器材测试的标准参考频率，通常在音响器材中给出的参数是在 1kHz 下测试。这是人耳最为敏感的频率。	
1.2KHZ	这个频率可以适当多一点(不宜超过 3dB)可以提高声音的明亮度；过多则会使声音发硬。	
2－4KHZ	这个频率成分如果过少，听觉能力会变差，语音显得模糊不清；如果这个频率成分过强了，则会产生咳声的感觉。同时这个频段对音乐的层次感影响较大，有适当的提升可以提高声音的明亮度和清晰度，但是在 4kHz 时不能有过多的突出，否则女声的齿音会过重。	部分女声、以及大部分吹奏类乐器。

4－8KHZ	这段频率最影响语音的清晰度、明亮度、如果这频率成分缺少，音色则变得平平淡淡；如果这段频率成分过多，音色则变得尖锐，人声可能出现齿音。	部分女声、以及大部分吹奏类乐器。
8－12KHZ	这个频段是音乐的高音区，对音响的高频表现感觉最为敏感。适当突出（5dB 以下）对音响的的层次和色彩有较大帮助，也会让人感到高音丰富。但是，太多的话会让人感到声音发尖、发毛。如果这段缺乏的话，声音将缺乏感染力和活力。	长笛、双簧管、小号、短笛等高音管乐器。
12－16KHZ	这段频率能够影响整体的色彩感，这段频率过于黯淡会导致乐器失去个性，过多则会产生毛刺感。	镲、铃、铃鼓、沙锤、铜刷、三角铁等打击乐器的高频泛音。
16－20KHZ	这段频率可能很多人都听不到，但这段频率可以影响高频的亮度，以及整体的空间感，这段频率过少会让人觉得有点闷，太多则会产生飘忽感，容易产生听觉疲劳。	电子合声、古筝钢琴等乐器的泛音。

2. 和主观心理感情色彩相关的描述

主观术语	主观描述	具体解释
清晰度	清晰，模糊，浑浊	节目可懂度高，乐队乐器层次分明，有清澈见底之感。
平衡度	平衡，不平衡	节目各声部比例协调，立体声左，右声道的一致性好，声像正常。
丰满度	丰满，单薄，干瘪	中低音充分，高音适度，响度合宜，有温暖，舒适感，有弹性。
力度	坚实有力，力度不足	声音坚实有力，能出得来，能反映原声源的动态。
圆润度	圆润，毛糙	优美动听，有光泽但不尖糙，主要用以评价人声和某些乐器。
明亮度	明度，灰暗	高，中音充分，听感明朗，活跃。
柔和度	柔和，尖硬	声音松驰不发紧，高音不刺耳，听感悦耳舒服。
融合度	融合，松散	整个音响交融在一起，整体感好。
真实感	真实，失真	声音逼真， 失真：声音破，炸，染色等。
临场感	临场感	重放出的声音使人有“身临其境”的感觉。
立体感	立体，单一	声音有空间感，不仅声像方位基体准确，声像群分布正确，而且有宽度和纵深感。

5.4.6 听音与各频段的调节关系

一般来说，听音师会根据自己听到的音乐品质，进行各频段的调节，当各频段的成分过高或过低时，都会对整机有明显的感觉，一般的调节规则如下：

频段	范例	调节过低	适中	调节过高	简明
20Hz-60Hz	31Hz	空虚	空间感良好	低频共振声显现“嗡”的声音	空间感
60Hz-100Hz	62Hz	无力	浑厚感强	低频共振声显现“轰”的声音	浑厚
100Hz-150Hz	125Hz	单薄	丰满度增强，混浊	混浊，显现“哼”声	饱满
150Hz-300Hz	250Hz	软绵绵	声音力度强	生硬	力度
300Hz-500Hz	500Hz	空洞	语音有力度感	有电话声音色	
500Hz-1KHz		有收缩感	声音的轮廓明朗	声音向前凸出	喉音
800Hz		松弛感	强劲感	喉音重，鼻音	鼻音
1-2KHz	1KHz	松散，使音色脱节	通透感强	跃感	通透
2-3KHz	2KHz	朦胧	明亮度增强	呆板	明亮
4KHz	4KHz	模糊	穿透力强	咳音量	
4-5KHz		音源边远	响度感强	声音变近，人声靠前	靠前
5-6KHz		含糊	清晰度强	尖利	
6-8KHz		暗淡	透明	齿音重	
8-10KHz	8KHz	平淡	S 音明显，通透感	尖锐	S 音
10-12KHz	16KHz	乏味，失去光泽	金属声强烈	尖噪	
12-16KHz		失掉色彩	金光四溅	刺耳	金属
16-20KHz		韵味失落，色彩失落，缺乏音色表现力	靠人体颚骨传导感受声音的韵味，色彩富于音色表现力	宇宙声感和不稳定感	

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.

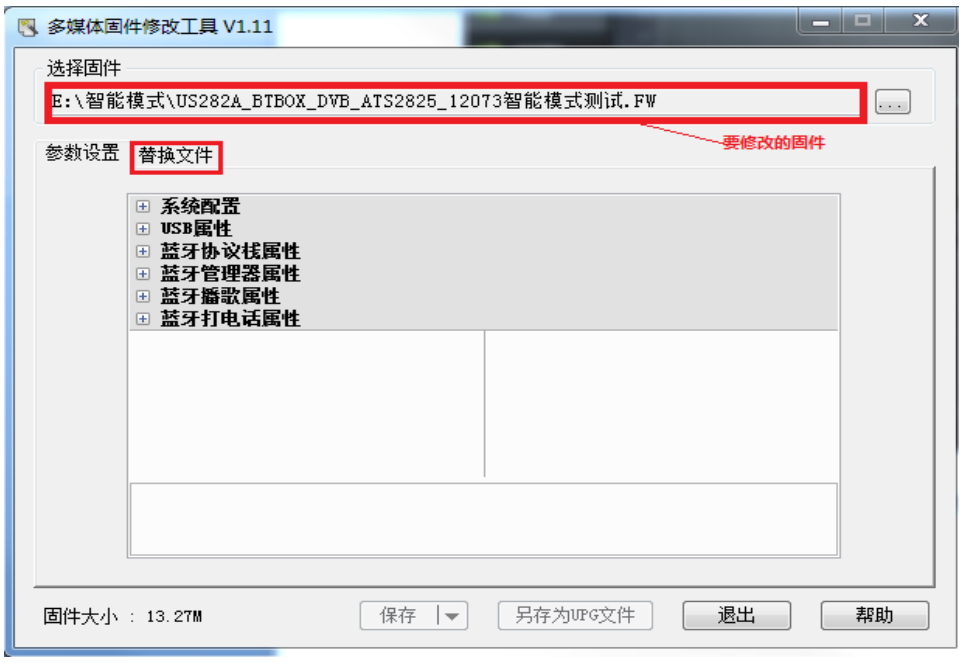


Fig 35 Firmware Modify Tool

3. Click the replacement file to get the image below:

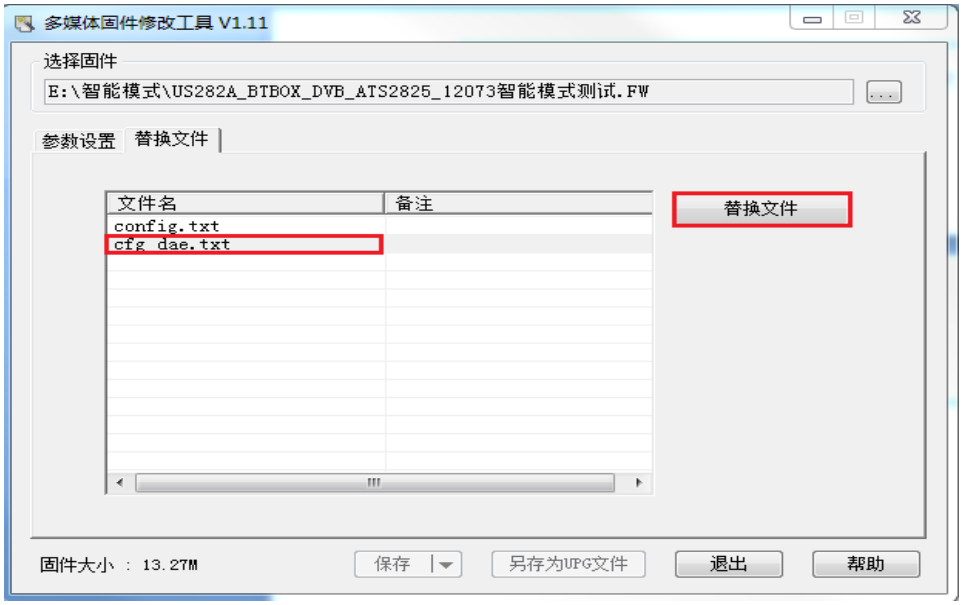


Fig 36 replacement file

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

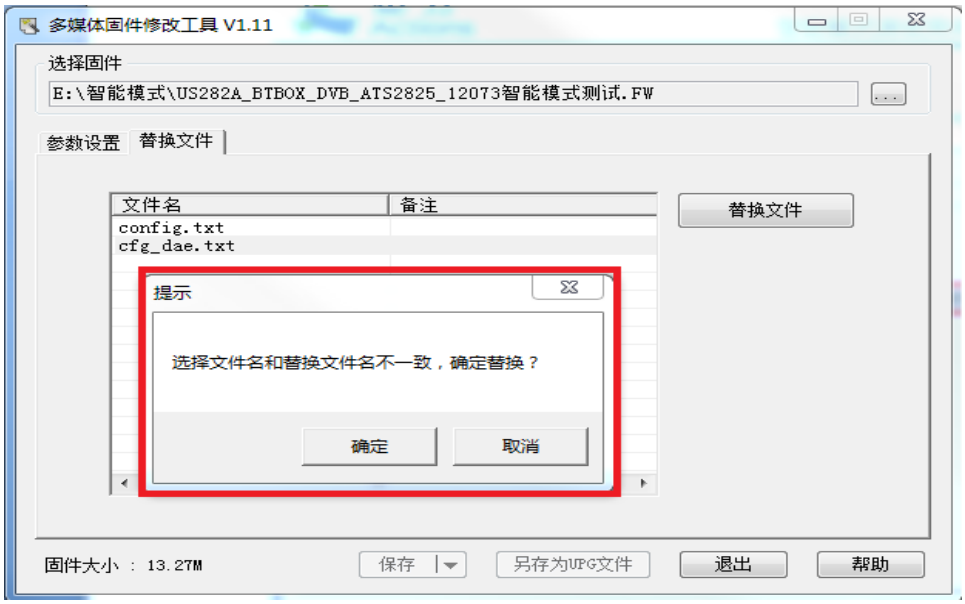


Fig 37 replace dialogue

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

7. 关键词译

- 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.声 明

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