CA935 High Pressure Microphone Calibrator

Features:

- Designed based on Oberst variable cross-section tube principle
- Calibration dynamic range from 94 dB to 180 dB
- Build-in loudspeaker with high-sensitivity and low-distortion, total harmonicdistortion ≤0.5 % (@ 171 dB / 500 Hz), ≤2.5 % (@ 180 dB / 500 Hz)
- MPA473S (optional) high pressure microphone can be selected as reference microphone.

Applications:

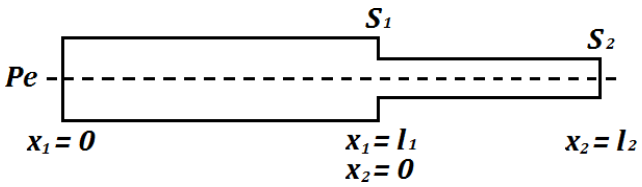
- Linearity calibration of microphone or sound level meter
- High sound pressure calibration and distortion measurement of microphone

Introduction

Because there are so many high sound pressure environments in the fields of national defense and aerospace, the research of high sound pressure is more and more important in modern science. In order to carry out these studies, there are many high sound pressure microphones, whose maximum sound pressure level often exceed 170 dB, even reaching 180 dB. How to verify whether they can really reach the declared target sound pressure level, and measure the linearity and distortion has become a new topic.

The traditional high sound pressure calibrator, such as CA915 of BSWA, can only achieve the maximum sound pressure level of about 160 dB. The calibrator is very heavy and needs high poweramplifier drive.

In 1940, Oberst proposed a method to obtain large amplitude pure sound wave in a closed tube, that is, two cylindrical tubes with different radius are connected. By using the resonance characteristics of the variable cross-section tube, the internal high-order harmonic vibration can be effectively suppressed, and the pressure ratio can be greatly improved. When the sound source is excited at the end of the thick pipe, the sound wave with high sound pressure and low distortion willbe produced at the end of the thin pipe under resonance condition. As shown in the figure below:



If the end of the tube is assumed to be a rigid interface, the sound pressure level is:

$$|p_2(l_2)|^2 = \frac{p_e^2}{A^2 + B^2 + [1 - (S_2/S_1)^2]C}$$

Where P_e is the sound pressure level at the source end, S_1 and S_2 are the cross-sectional areas of the large and small tubes respectively, l_2 is the length of the small tube, A, B and C are the quantities related to the sound frequency, tube length, tube radius and tube damping coefficient. Based on this theory, a variable cross-section tube can be designed for linearity and distortion calibrator of high sound pressure microphone.

Based on the principle of Oberst variable cross-section tube and the original SW4XX1 series impedance tube, BSWA has launched **CA935** high sound pressure calibrator with built-in high sensitivity and low distortion loudspeaker, which can form a stable, pure and low distortion large amplitude sound field in the cavity, with a dynamic range of 94 dB ~ 180 dB. It also has a reference microphone installation position, which can be used for real-time monitoring of the sound pressure in the tube.

The internal acoustic coupling cavity of **CA935** calibrator is designed to achieve the maximum sound pressure level at 500 Hz resonance frequency. The distortion of calibrator sound source withindynamic range ≤ 2.5 %. It is suitable for microphone distortion measurement and high pressure microphone calibration to avoid measurement error caused by overload. Due to the particularity of working environment of high sound pressure microphone, its diaphragm is easy to change or even damage due to the bad environment. Therefore, it is necessary to verify the linearity and total distortion of high sound pressure microphone regularly.

MPA473S high pressure microphone can be selected as the reference microphone to monitor the real sound pressure level in the calibrator cavity. In order not to affect the accuracy of the test, the MPA473S is specially selected to achieve a total distortion including the microphone and high pressure calibrator doesn't exceed 2.5 % at 180 dB.

With BSWA high sound pressure linearity test software and data acquisition, a high sound pressure calibration system can be formed. The system can simultaneously measure the sound pressure level and total distortion of the reference microphone (Ref. MIC) and the microphone to be test (DUT). By comparing the difference of the sound pressure level of the reference microphone and the microphone to be test, the sound pressure linearity of the microphone to be test can be obtained.

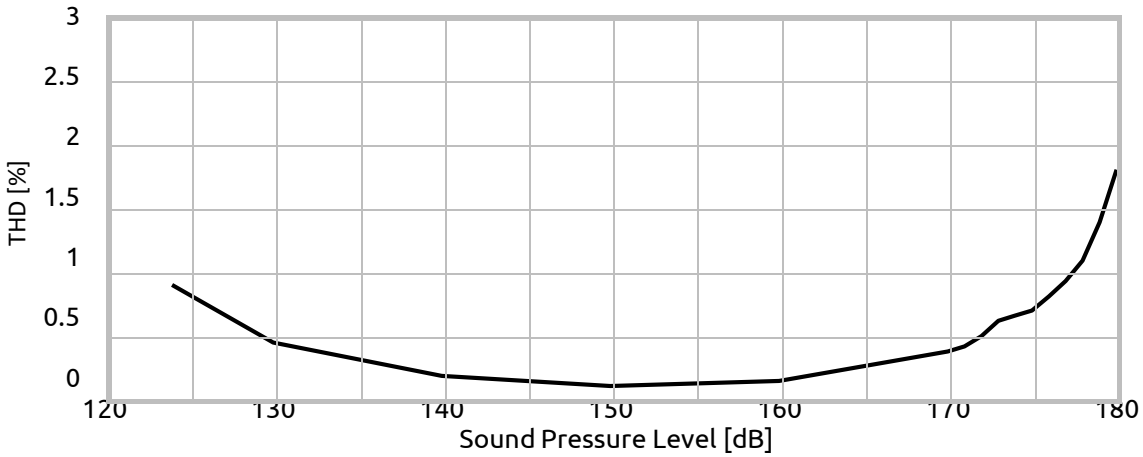
Specifications

Maximum Input Power	400 W_{RMS} (maximum continuous working time 30 s)
Rated Impendence	4 Ω
Test Frequency (Resonance Frequency)	500 Hz
Dynamic Range	RMS: 94 dB~180 dB, Peak: 97 dB~183 dB
Total Harmonic Distortion	≤0.5 % (@171 dB / 500 Hz), ≤2.5 % (@180 dB / 500 Hz)
Input Connector	Push terminals
Loudspeaker Unit	Neodymium compression drivers
Reference Microphone[1]	MPA473S high pressure microphone (optional)
Microphone Under Test	1/2" and 1/4" microphone according to IEC 61094-4 standard
Dimension[2] (mm)	W260 x H668 x D261
Weight[2]	9.3 kg

Note 1: The reference microphone position is only available for 1/4" microphone.

Note 2: CA935 only, not including the reference microphone and microphone under test.

The Test Result of Reference Microphone MPA473S in CA935



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