

Tone Testing

Application Note

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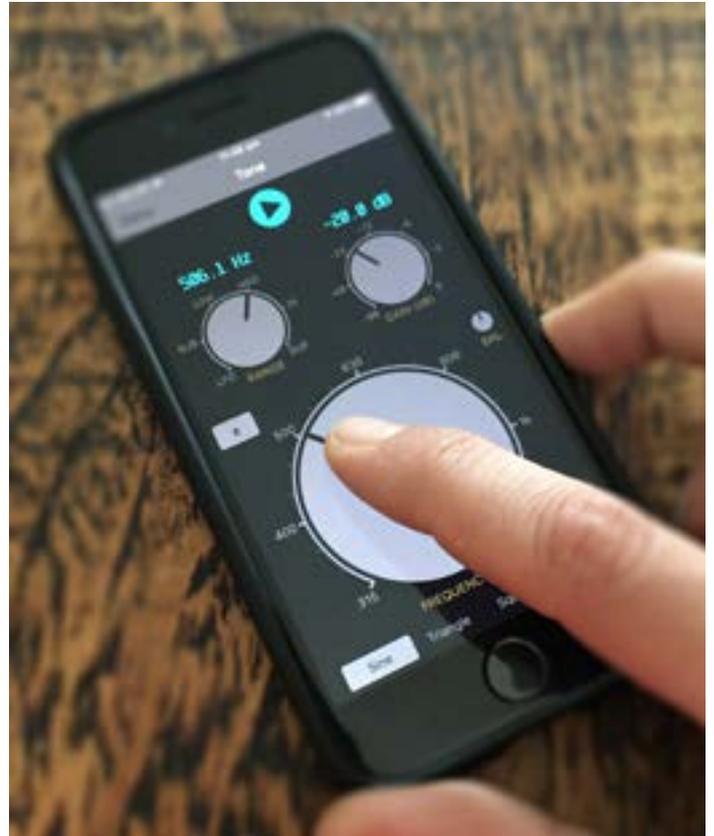
Introduction

This guide describes essential practices when testing on-site to ensure installation longevity, the best possible audio performance, and ultimately a happy client.

Every Amina invisible loudspeaker and subwoofer endures rigorous quality assurance tests before being assigned a serial number and leaving our factory. We understand the uniquely permanent nature of custom install technology and the importance of getting it right the first time.

As Amina's prerequisite installer training emphasises, one of the most important installation steps to take is full and proper testing to confirm flawless performance before committing to plaster. Once speakers are edge-filled, any opportunity to address audio issues is greatly limited at best, and in the worst case scenario unidentified audio issues may require that a newly installed speaker is cut out and replaced. Time pressures are commonplace in construction projects, but a thorough testing procedure will avoid greater delays later on.

For this reason, testing is conducted before any filling or plastering. The purpose of testing is to identify any issues with the installation or surrounding construction that might affect audio performance.



Because audio issues may only manifest at particular frequencies the sweep test is designed to excite the speaker across its entire frequency range. This is done by sending a clean sine tone through the speaker, and slowly 'sweeping' through the speaker's frequency range. By doing this any issues will become audible as buzzing, rattling or another form of distortion at particular point(s) during the sweep. Any deviation to the clean tone of a sine wave indicates an issue.

IMPORTANT: It is not sufficient to play music for testing purposes. Music will only touch on some frequencies of the sound spectrum, leaving the possibility of missing audio issues.

Preparation

To prepare for testing, we recommend sourcing a portable amplifier (30W minimum, ideally with Bluetooth) and the use of a smartphone with a tone generator app that has the ability to 'sweep' through the frequency range of the speaker. A Bluetooth connection between the amplifier and signal generator is particularly useful in projects with a central point of termination or with long cable runs as this allows straightforward control of the tone generator from the listening position(s). Recommendations are made below for a number of amplifiers and tone generators for convenience, but amps & apps other than those listed may also be used.

Recommended test amplifiers:

SMSL AD18 Stereo Bluetooth; 80W x 2
Nobsound Mini Bluetooth Power Amplifier; 50W x 2
AV Link STA50-BT; 50W x 2

Recommended tone generators:

Signal Gen by Mediapunk Studios; iOS & Android
Tone Generator by TMSoft; iOS & Android
Online Tone Generator by T. P. Szynalski; Web browser

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Signal path

Connect the amplifier speaker output to the speaker via an APU, then connect the phone to the amplifier input by bluetooth. Set smartphone and amplifier volume to minimum to avoid any sudden, loud bursts of sound.



Process

With the test equipment connected as described above, we can begin tone testing each speaker individually. This is ideally performed when background noise is at a minimum to enable a clear evaluation of the speaker and the installation.

Start with the test tone at around 100Hz and gradually increase the volume of both the app and amp until a moderate volume is achieved. That is; loud enough to excite the surrounding construction, but not so loud as to strain the speaker. (If no tone plays, check connections and app settings)

It is important to thoroughly test frequencies from the lower limits of the speakers frequency range (stated in

the datasheet) up to 10kHz. Most construction issues will manifest at lower frequencies. Slowly 'sweep' up or down through the frequency range, all the time carefully listening for a change in timbre of the test tone. Any issues will manifest as a 'buzzing' or 'rattling' sound. Recordings of some different examples can be seen [here](#).

If any noise issues are encountered during the testing process, make a note of the frequency and continue sweeping through the rest of the frequency range to ensure there are no noise issues at other frequencies.

If the speaker being tested plays a clear sine tone throughout the frequency range, the speaker is ready to be plastered in. If any issues are identified, refer to the troubleshooting steps below.

Troubleshooting

If any noise issues are discovered during testing, they must be remedied before the installation can continue. To help localise the source of noise, play the test tone at the frequency the problem was found at, and carefully listen to try and pinpoint where the noise is coming from.

If the noise source doesn't seem to be coming directly from the speaker, gently apply pressure to the area and listen for a change in character of the sound. Stop the test tone and knock on the structure around the speaker and listen for signs of unsecured construction, like plasterboard against studwork. If loose plasterboard is found, secure by driving extra screws through the drywall into the studwork / joists.

If the noise source seems to be from the speaker itself, check the four speaker screws to make sure they are not loose. If that does not eliminate the noise, determine if the speaker itself has an issue by removing from its

mounting points and playing the test tone while holding the speaker in free air.

With the speaker removed, check that the cabling is properly routed and not in contact with the speaker or backbox, and either reroute the cable or use an offcut of batting between the speaker cable and the contact area, taking care to ensure nothing can come in contact with the active speaker panel.

Check that there is no construction debris resting in the panel or backbox. Remove any larger pieces by hand and vacuum thoroughly to remove hidden debris, paying extra attention to the perimeter under the metal frame. If necessary, remove the backbox and check the void for debris and loose materials. Remove if found.

Once installed speakers are confirmed to be clear of any issues, filling and finishing can commence. As always, please contact Amina's technical support for any further assistance.

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