ENCLOSURE CHECK

technical bulletin

version 1.0

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SAFETY INSTRUCTIONS

1. **Read this document.**
2. **Read all SAFETY INSTRUCTIONS carefully as well as DANGER and OBLIGATION warnings.**
3. **Never incorporate equipment or accessories not approved by L-Acoustics®.**
4. **Beware of sound levels.**

   Do not stay within close proximity of loudspeakers in operation and consider wearing earplugs.
   Loudspeaker systems are capable of producing very high sound pressure levels (SPL) which can instantaneously lead to permanent hearing damage to performers, production crew and audience members. Hearing damage can also occur with prolonged exposure to sound: 8 h at 90 dB(A), 30 min at 110 dB(A), less than 4 min at 130 dB(A).
5. **Strictly follow the sequence of the successive steps in all procedures.**
6. **Solicit qualified personnel for any maintenance operation.**
7. **Do not expose the product to extreme conditions.**
   Do not expose the product to rain or sea spray.
   Do not expose the product to moisture (mist, steam, humidity, condensation…) or excessive heat (direct sun, radiator…) for a long period of time.
8. **Do not store the product on an unstable cart, stand, tripod, bracket, or table.**

SYMBOLS

The following symbols are used in this document:

DANGER
This symbol indicates a potential risk of harm to an individual or damage to the product.
It can also notify the user about instructions that must be strictly followed to ensure safe installation or operation of the product.

OBLIGATION
This symbol notifies the user about instructions that must be strictly followed to ensure proper installation or operation of the product.

INFORMATION
This symbol notifies the user about complementary information or optional instructions.

INTRODUCTION

This technical bulletin describes how to use the LA4X amplified controller **ENCLOSURE CHECK** function.

The **ENCLOSURE CHECK** function measures impedance at the reference frequencies for the connected loudspeaker family. The measured impedance is compared to the expected range allowing for fast detection of loudspeakers presenting circuit continuity issues.

The results can be used for preliminary diagnosis but cannot replace a comprehensive quality control.

The **ENCLOSURE CHECK** function is only available on calibrated LA4X amplified controllers. Refer to the **LOAD SENSOR CALIBRATION TOOL technical bulletin** for more information on calibration.

REQUIREMENTS

The **ENCLOSURE CHECK** measurements are not reliable if the following requirements are not met:

Environment and temperature

- Room temperature must be comprised between 0°C / 32°F and 40°C / 104°F.
  Ideal temperature is 20°C / 68°F.
- Loudspeaker enclosures must be at room temperature.
  If warm from a recent high level use or recently moved from a cold environment, let the loudspeakers reach room temperature before starting.

Loudspeakers

- Loudspeaker presets must be included in the embedded LA4X preset library.
- Loudspeaker enclosures must be in nominal operating conditions:
  - Remove covers or dollies obstructing the loudspeakers or the vents,
  - Check for obvious physical damage or air leak:
    Visually inspect the grill, gasket, cabinet, and connector plate for loose, missing or damaged parts.

Connection

- Use only 10 m/30' 4 mm²/AWG 11 speaker cables.
- Do not connect enclosures in parallel.
  One LA4X can simultaneously test up to:
  - four passive loudspeakers or subwoofers (one per output):
    5XT, 8XT, 12XTi, 12XTP
    ARCS Wide/Focus
    Kiva
    SB15m, SB18, SB18i, SB18m
  - two 2-way active enclosures (one on output 1-2, one on output 3-4):
    12XT (A), 115XT HiQ
    ARCS II
    Kara
  - one 3-way active quad-amplified enclosure:
    K2, Kudo

Amplified controllers

- LA4X must run at least firmware version 1.2.0.29.
- Amplified controller load sensors must be calibrated.
  Refer to the **LOAD SENSOR CALIBRATION TOOL technical bulletin** for more information.
- Amplified controller must warm up for at least 10 minutes after power up.
  Do not power off, reboot or switch to standby mode to avoid resetting the countdown.
- Load a preset corresponding to the connected loudspeaker's family from the embedded preset library.
  Presets from the user memories, custom presets or not, may be used on condition they are made of presets from the same family as the family supported in the embedded preset library.

PROCEDURE

The **ENCLOSURE CHECK** measurements are not reliable if the requirements are not met.
Make sure the test conditions meet the requirements before starting the check. Refer to section REQUIREMENTS.

1. Power up the amplified controller and let it warm up for at least **10** minutes.
2. Connect the loudspeaker enclosures to the amplified controller.
3. On the amplified controller, load a preset corresponding to the connected loudspeaker's family
4. On the amplified controller, use the encoder wheel to select **MONITORING & INFO**.
   Press the **OK** key or the encoder wheel to validate.
5. Use the encoder wheel to select **ENCLOSURE CHECK**.

BEWARE OF SOUND LEVELS
Although the sound pressure levels generated for the **ENCLOSURE CHECK** are moderate, do not stay within close proximity of the loudspeakers and consider wearing earplugs.

6. Press the **OK** key or the encoder wheel to launch the **ENCLOSURE CHECK**.

   Short sinusoidal signals are generated by the amplified controller simultaneously for each connected output.
   The results are displayed for each output.

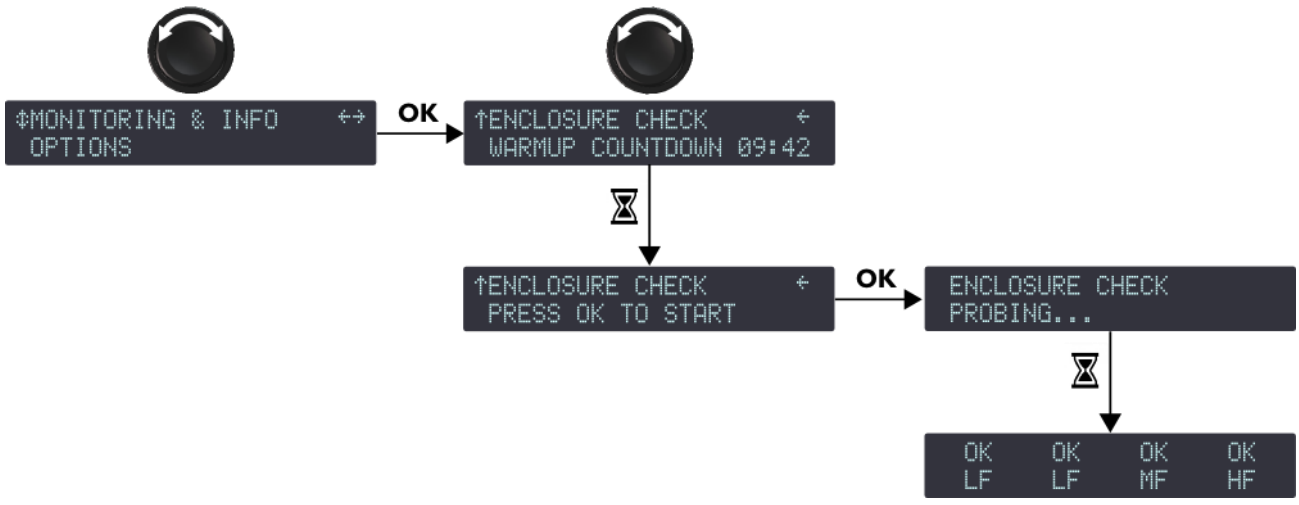

Figure 1: Launching ENCLOSURE CHECK - example with one K2

7. Hold the **OUT** key to display more details on the corresponding result (only available for **NC**, **NOK** and **UNDEF**).
   Refer to section RESULTS for more information.

RESULTS

Five different results can be displayed for each output: **OK**,**?**, **NC**, **NOK** and **UNDEF**.

Table 1: Interpreting the results

Result	Description	Interpretation
OK	measured impedance is within expected range	Enclosure is in working order electrically
?	unsupported preset family	Only supported enclosures should be tested
NC	Not Connected	If cables are connected: 1. Inspect the cables and connections If necessary, replace the cables and repeat the check. 2. Hold the **OUT** key for details and open the enclosure for investigation.
NOK	measured impedance is not within expected range	1. Check that all the requirements are met (see section REQUIREMENTS). Check in particular that the loaded preset corresponds to the connected loudspeaker's family. 2. Inspect the cables and the connections If necessary, replace the cables and repeat the check. 3. Hold the **OUT** key for details and open the enclosure for investigation.
UNDEF	measured impedance is undefined	

Under **NC**, **NOK** and **UNDEF** results, press and hold the **OUT** key to display the tested frequencies, details on the measured impedance, and the number of operational transducers out of the total.

Details on the measured impedance can be:

- **OPEN** for open circuit (found in **NC** results)
- **SHORT** for short circuit (found in **NOK** results)
- a percentage of variation from the expected range (found in **NOK** and **UNDEF** results)

Once the causes for short circuits and unexpected open circuits are identified and fixed, repeat the check.

Illustration 2 shows the results of an **ENCLOSURE CHECK** on one K2 loudspeaker enclosure: LF and HF sections results are **OK** and MF section result is **NC**.

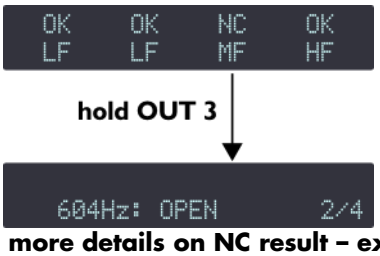

Figure 2: Displaying more details on NC result – example with one K2

Holding **OUT3** displays the details for the **NC** results:

- **604Hz**: tested frequency
- **OPEN**: open circuit
- **2/4**: two of the four transducers of the MF section are operational

If no fault can be found in the cables and connections, the K2 should be further investigated for continuity failures in the MF section, then **ENCLOSURE CHECK** should be repeated.

Illustration 3 shows the results of an **ENCLOSURE CHECK** on four 5XT loudspeaker enclosures: three with results **OK**, and one with result **UNDEF**.

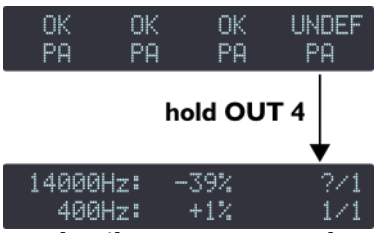

Figure 3: Displaying more details on UNDEF result - example with four 5XT

Holding **OUT4** displays the details for the **UNDEF** result:

- for the HF transducer:
  - **14000Hz**: tested frequency
  - **-39%**: variation from the expected range
  - **?/1**: further investigation is needed
- for the LF transducer:
  - **400Hz**: tested frequency
  - **+1%**: variation from the expected range
  - **1/1**: transducer is operational

Low variations from the expected range are acceptable: displayed percentage can be different from **0** and all transducers considered operational. It means the measured value pertains to the acceptable range expected for the considered section in nominal conditions of measurement.

If the requirements are met, the used preset is from the loudspeaker's family, and cables and connections are in working order, the 5XT should be further investigated for issues in the HF transducer, then **ENCLOSURE CHECK** should be repeated.