AMPETRONIC

Generic procedure & guide to completing a Counter Loop Certificate of Test & Conformity

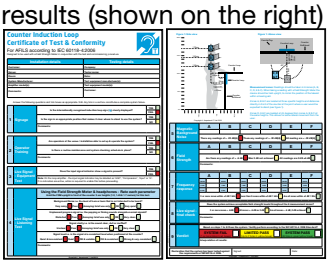
Overview

1. This procedure is for checking an Induction loop systems (otherwise known as a hearing loop, T-loop or 'AFILS' performance when installed at a counter with a fixed loop, and can be used for systems from any manufacturer or installer. You should always read the manufacturer's handbooks in conjunction with this document when testing a system.
2. The procedure takes into account how the system is actually used by the operator. A representative of the client should be present at the time of measurement, and preferably the person who would normally set-up or enable the system for use. You will also need access to the induction loop amplifier (normally attached to the bulkhead of the counter, or maybe available on request if it is a portable system) to conduct the tests.
3. To use this procedure the loop amplifier must have an indicator which shows when the Automatic Gain Control (AGC) is activated. This indicator may be labelled as 'AGC', 'Compression', 'In' or 'Input' on the amplifier. Most amplifiers have this feature.
4. You will need to follow several steps to check the system, and write your findings on the 'Counter Induction Loop Certificate of Test & Conformity' which accompanies this document.
5. For the purposes of this document the reference standard is IEC60118-4:2014.

Equipment required

You will require:

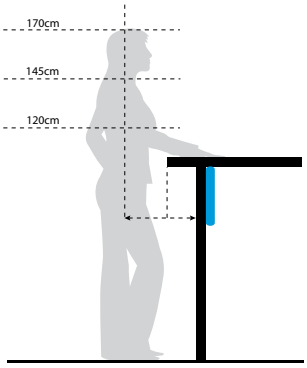
- A field strength meter (FSM), or professional audio analyser that reads 0dB at 400mA/m field strength, and headphones to listen to the loop system
- This document.
- The 'Counter Induction Loop Certificate of Test & Conformity' for filling in your results (shown on the right)



- Signal generator / source with adjustable output level capable driving signal into AGC
- Cable set to connect to most input options
  - Line level input - on twin (stereo) phono (RCA / pin jack) connectors.
  - Line level input - on 6.3mm (1/4") 2-pole jack connector with adapto.
  - Balanced Microphone input - using XLR connector (30dB attenuation).
  - Electret Microphone input on 3.5mm 2-pole jack connector (30dB attenuation).
  - Bare wires – Unbalanced connection to inputs with screw terminals

Note: Depending on the output range that the signal generator is capable of achieving - cables for lower level inputs such as microphones may require in built attenuation.

Test procedure



- Use the 9 steps in the following procedure to evaluate the system, recording data as requested as you go.
- When using the field strength meter in Steps 3 to 8, always hold the device (normally vertically) at the normal head height and position of the hearing aid users. If users may be seated, take the measurement from a seated position and hold the meter directly in front of your head.
- Measurement zones are stipulated on the 'Counter Induction Loop Certificate of Test & Conformity' and represent the ear height and lateral movement ranges of the average user as defined in the IEC 60118-4 Standard.

Step		Procedure / Test	Results	Notes
1	Signage	Inspect the counter(s). **Is there appropriate signage to show there is a loop system present?**	YES FAIL	An induction loop sign must be displayed. A **FAIL** in this step means overall **SYSTEM FAIL.**
		Note any observations on the signage and staff awareness of the coverage area. **Is it clear where to the hearing aid user should expect to stand to use the system?**	YES NO	Staff should be aware and able to advise the hearing aid user where there is coverage.
2	Operator training	Ask the system operator to prepare the system for use, and demonstrate the location of the system microphone(s). **Are staff able to set-up / operate the system?** This test may not be necessary if the system is permanently switched on.	YES FAIL	If the system requires set-up and the staff are not available to do this then the system is of no benefit even if it is a good system. A **FAIL** in this step means overall **SYSTEM FAIL.**
		Ask the staff if there is a procedure in place to routinely check the performance of the loop system. Ask to see there maintenance records and testing equipment to verify this. **Is there any routine maintenance / checking of the system?**	YES NO	If no routine test is in place the system may be malfunctioning, or switched off without the venue knowing – meanwhile the system is still advertised as working. **Routine checking is a basic requirement.**
3	Live signal - Equipment test	With the system operating as the staff have shown, check that the input signal level to the amplifier with real signals is set at the right level: • Identify at least one indicator on the induction loop amplifier labelled: 'Compression', 'AGC', 'Signal Input' or 'In'. • The indicator should be illuminated when normal sounds (e.g. speech) are used in the system **Does the input signal indicator show a signal is present?** This indicator shows that the input signal is turned up enough - which in turn enables the amplifier to control the output level it provides.	YES NO	If this indicator does not illuminate then this could signify: • Incorrect use or position of microphones • Level from mixer or P.A. system is too low at the input to loop amplifier Performance may be improved by applying more gain to the input of the loop amplifier. In this situation remedial action is advised irrespective of results obtained in later steps

Step		Procedure / Test	Results	Notes
4	**Live Signal Listening Test**	With the loop system running as shown in Step 3 - the signals could be: • Live speech - ensure the talkers are in typical positions relative to the microphone(s) in question • Recorded programme material (e.g. DVD player) • PA announcement Listen to the loop signal on the meter / monitor with headphones at a suitable volume level, over area (see figure 1 on the 'Counter Induction Loop Certificate of Test & Conformity' document). Fill in the report form with your assessment of: • **Background noise – level of hum or buzz that is not intended to be heard?** • **Unpleasant program signal – popping or fizzing sounds alongside normal signals?** • **Signal clarity – is the sound clear or dull and muffled?** • **Signal level – is the signal and consistent level throughout the coverage area?** • **Can you hear interference from other nearby loop systems, known as 'spill'?**	Rate each parameter accordingly and make appropriate notes. The rating of each parameter determines a **PASS** or **FAIL**	High noise levels can interfere with the use of the system, and a **PASS, LIMITED PASS** or **FAIL**. • Noise can be external (present with loop off) or due to an input / set-up fault (may be identified in Step 5). • Audible distortion can be due to incorrect amplifier specification, overdriving of the loop, or input overload. • Loss of clarity can occur if the system (amplifier and loop position) have not been designed to compensate for the effects of metal. • Signals should register on the meter scale (not necessarily 0dB). Systems used only for brief conversations such as at counters are generally more tolerant to an annoying noise. An unacceptable result for any of the four main parameters means overall **SYSTEM FAIL.** An unacceptable result for the final test means the system may be incorrectly specified and/or have issues with metal. Steps 6 & 7 will evaluate whether this is a serious problem or not. If signal spill is significant, systems may need to be moved further apart.
	Power down	Switch the loop system off Ensure other lighting, heating or AC powered equipment is switched on to represent the venue in normal use	-	**To test background noise in Step 5 the loop system need to be switched OFF**

Step		Procedure / Test	Results	Notes
5	**Background Noise**	While the system is off, use the meter to take readings of any magnetic Background Noise (with A-weighting filter) throughout the 6 measurement zones and record the results in boxes A to F. Remember to keep the meter upright (in most cases) to replicate the position of the telecoil within a standing persons hearing aid. **Good areas: Measurements of Lower than -32dB will not interfere with the induction loop system.** **Background noise of greater than -32dB may affect users of the system and affect audio quality, this is not an outright FAIL for a counter loop system as the user will only experience the system for a short period of time.** **Readings of -22dB of greater indicate unusable areas. Background noise will be significant, affecting intelligibility.** • Make notes describing the type of noise (e.g. hum, buzz)	Rate each parameter accordingly and make appropriate notes. The rating of each parameter determines a **PASS** or **FAIL**	High noise levels can interfere with the use of the system. Overall system PASS or FAIL is dependant on the level and how much of the area is affected by the noise - so some good judgement is required. If levels above -32dB are recorded in a significant proportion of the listening area then the noise should be investigated. Magnetic background noise is often caused by electrical wiring or equipment, it may be possible to easily move or correct the cause.
	Identify signal test zones	The ‘‘Counter Induction Loop Certificate of Test & Conformity’ stipulates six measurement zones that represent average head heights, standing positions and lateral movement of system users. **Take readings at each point and enter the results into the corresponding boxes on the Certificate.**	-	Counter induction loops function by utilising the audio frequency of the magnetic field generated outside of the inductive loop (overspill), which is normally installed on the bulkhead of the counter that separates client from staff. Signal strength and background noise can vary greatly over small distances using this method. It is therefor imperative to check all specified zones.
	Swap signal inputs	In readiness for the following test: Identify each cable and its respective input (so they can be re-connected later) and disconnect the input to loop amplifier. **Connect the signal generator to the input and set it to a low level.** System testing signals for Ampetronic equipment can be downloaded from the Ampetronic Website.	-	Follow manufacturer’s instructions for the signal generator (CD or MP3 player etc) Use appropriate signals as specified in the manufacturer’s instructions for testing loop systems.
	Power Up	• Turn the loop system back on. • Increase the level of the test signal until at least one of the following LEDs are illuminated ‘Compression’, ‘AGC’, ‘Signal Input’ or ‘In’.	Further testing is not possible without this indication	Loop signal levels cannot be guaranteed unless the input stages are operated correctly.

Step		Procedure / Test	Results	Notes
6	**Field strength**	Select appropriate test signal, and set the meter to measure **Field Strength**. Test the level at the measurement zones (A-F). Note results in the table. Does the system achieve acceptable levels throughout the coverage area? **YES: 0 dB is achieved ± 6 dB** **NO: 0 dB achieved, some reading are outside of ± 6 dB tolerance** **FAIL: 0 dB was not achieved**	**YES** **NO** or **FAIL**	Ensure you have followed the manufacturer's instructions for the meter or monitor, and used the correct test signal. Possible reasons for **FAIL**: • System not set up correctly • Incorrect amplifier specification • System not designed to account for metal loss. The overall system verdict cannot better than the result achieved here.
7	**Frequency response**	Select appropriate test signal, and set the meter to measure **Frequency Response.** For each measurement zone, adjust the meter to test the level of 1 kHz, 100 Hz and 5 kHz. Note results in the table. Is the frequency response acceptable throughout the coverage area? **YES: 100 Hz and 5 kHz readings are within ± 3 dB of 1 kHz in at least 1 zone .** **FAIL: Frequency resonse requirement not achieved.**	**YES** or **FAIL**	Ensure you have followed the manufacturer's instructions for the meter or monitor, and used the correct test signal. Possible reasons for **FAIL**: • System not set up correctly • Amplifier doesn't have frequency response control (metal loss correction). • System not designed to account for metal loss. A **FAIL** in this step means overall **SYSTEM FAIL.**
	Re-connect inputs	In readiness for the following test: **Switch the loop system off. Re-connect the system inputs (normally a microphone) to the loop amplifier and turn the system back on.** **Re-check Steps 3 & 4: Live Signal tests**	Ensure each live signal is correctly controlled	Performing Steps 3 & 4 again ensure that re-connection was successful, and that the system is left in its original state.
8	**Live Signal Final Check**	Set meter to measure Field Strength and test the level throughout area. Does the meter read at least -6dB in all useable positions? **YES: At least -3 dB is achieved.** **NO: All zones greater than -6 dB.** **FAIL: 3 or more zones less than -6 dB**	**YES** **NO** or **FAIL**	Ensure you have followed the manufacturer's instructions for the meter or monitor. Due to the variable nature of live signals, it is important to make sure that the measurement time is long enough to catch the highest peak. A reasonable idea of level is likely to be determined after at least 60 seconds.

9	Verdict	**Interpreting results:** Based on the results of Steps 1-8 the system is judged as follows: **SYSTEM PASS** A system should only be passed if there are no failures recorded in any of the steps. i.e. No ticks in any of the red boxes or more than 2 ticks in any of the yellow boxes. The system is properly set up, used, maintained to deliver a consistent magnetic field throughout the counter area as required by a user of average height, with no significant noise. The requirements of IEC60118-4 have been met, and the system is of great benefit to any potential users. **PASS (Limited)** A system should be given a qualified pass if there are only 1 or 2 of the steps which are not passed, but which do not warrant a **SYSTEM FAIL** as detailed below. One or more listeners with hearing aids set to 'T' should assess the severity of any failed steps to determine the extent to which they affect the value of the loop system for the users. The system can receive a 'PASS with Limitations' where listeners decide: • That performance is still adequate at the identified points of failure; or • A hearing aid user could realistically choose to avoid those points of failure; or • A hearing aid user would have a low probability of experiencing an issue, due to the limited amount of these locations identified. If a 'PASS with Limitations' is awarded, the nature of the failures identified must be written down and explained to the system operator. **Remedial action is recommended to improve the system, but performance is still good enough for the users to gain a benefit from it.** **SYSTEM FAIL** A SYSTEM FAIL must be recorded if any of the 6 Steps show the following results: Step 1 Signage: There is no indication that a loop system is present. Step 2 Set-up / Staff training: Staff are not trained to operate the system. Step 4 Live Signal Listening Test: Signals are unacceptably noisy or distorted. Step 5 Background Noise Test: Large areas suffer levels >-22dB. Step 6 Field strength Test: Most of the area is not >-3dB and 0dB is not found. Step 7 Frequency Response: Most areas are not ±3dB compared to 1kHz. Step 8 Re-connect Inputs: -6dB levels are not found throughout most of the area. As such, users may not know the system exists, staff may not be trained to operate it, or the system is well outside requirements of IEC60118-4 for a significant area of the room. A SYSTEM FAIL can also be recorded if 3 or more of the Steps are not passed, but do not deserve a complete failure as above. Multiple minor issues cause an unsatisfactory experience and render the system well short of the demands of IEC60118-4. **Remedial action is urgently recommended to significantly improve the system.**
	Issue report	**Provide the venue with a copy of the form, complete with verdict – ensuring they understand any advice notes.**

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