

AMPETRONIC

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W5-2 Installation Handbook & Maintenance Manual



For full operating and maintenance instructions, plus design templates and other associated information please visit www.ampetronic.com/w52

www.ampetronic.com

Handbook Contents

- Safety
- Introduction
- Block Diagram
- Overview
- Connections, Controls & Indication
- Installation
- Connection & Set-up
- Troubleshooting
- Operating Instructions
- Technical Specifications
- Warranty
- Declaration of Conformity
- Maintenance Manual

Box Contents

- 1 x W5-2
- 1 x PSU + mains lead
- 4 x Self-adhesive feet
- 2 x 3.5mm 3 way terminal blocks
- 1 x 3.5mm 2 way terminal block
- 4 x 5mm 2 way terminal blocks
- 1 x Loop logo

Optional Accessories

- W5-2 cable tray & fixings





This symbol is used to alert the user to important operating or maintenance instructions.



The Lightning bolt triangle is used to alert the user to the risk of electric shock.

SAFETY

1. It is important to read these instructions, and to follow them.
2. Keep this handbook in an accessible place.
3. Clean only with a dry cloth. Cleaning fluids may affect the equipment.
4.  The amplifier generates some heat during normal operation and needs adequate ventilation. Do not install in a fully enclosed space.
5. Do not install this equipment near any heat sources such as radiators, heating vents or other apparatus that produces heat.
6. Refer all servicing to qualified personnel. Servicing is required when the apparatus has been damaged in any way, such as a power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to any rain or moisture, does not operate normally or has been dropped.
7.  **WARNING** – To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture. The apparatus shall not be exposed to dripping or splashing and no objects filled with liquids, such as vases, shall be placed on the apparatus.

Introduction

The W5-2 professional induction loop driver has been engineered for special loop design processes and cost-efficient considerations, allowing for the delivery of high-quality, low-spill hearing loop performance in compact spaces.

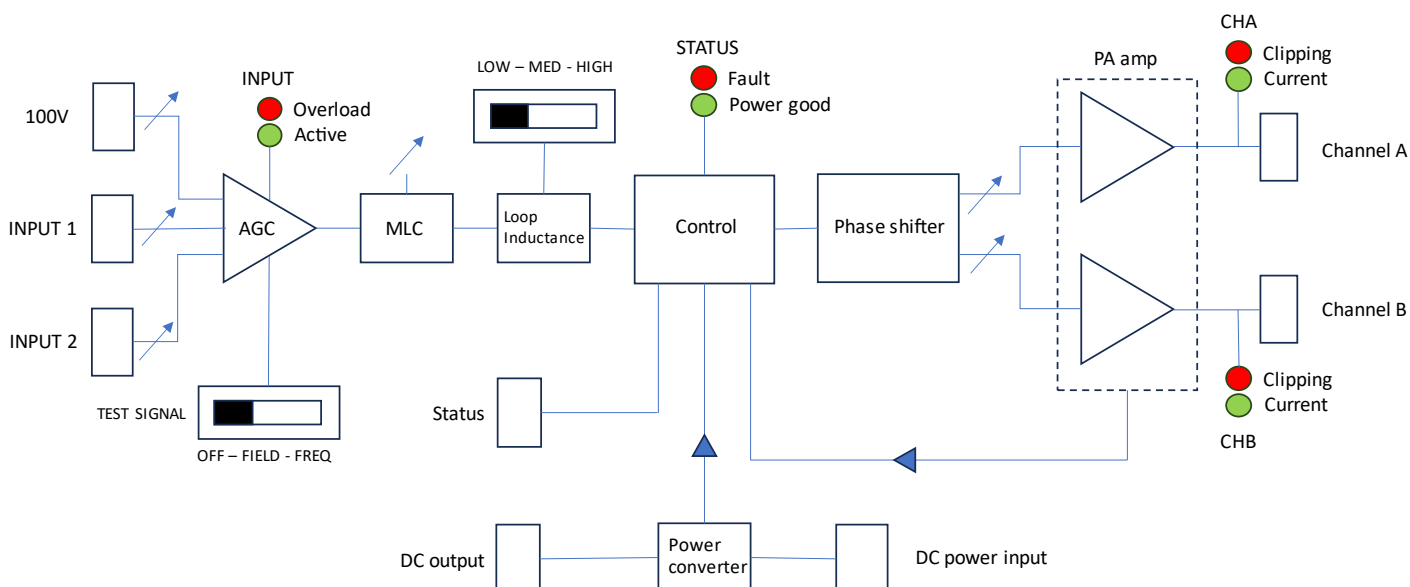
Designed for straightforward and discreet wall-mounted installations, it offers a practical solution for improving audio accessibility within confined environments.

Verification of the correct operation of the W5-2 induction loop driver is essential for each installation, and adjustments may be required to achieve compliance with the IEC 60118-4 Standard.

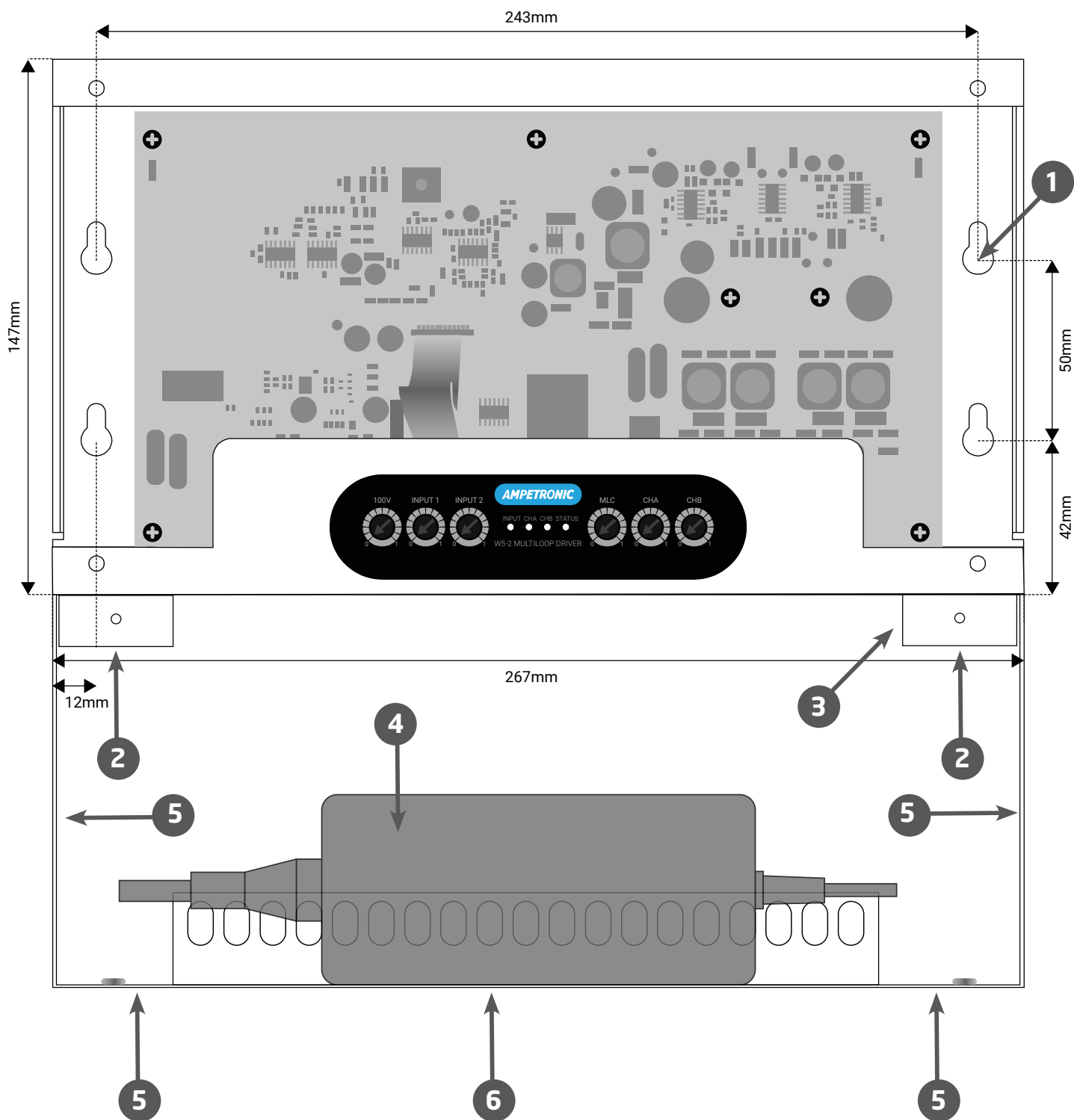
The W5-2 induction loop driver has been designed with ease of installation and use in mind.

The W5-2 operates as a Class D amplifier, ensuring increased efficiency and lower power consumption. Additionally, it features Euroblock screw terminal connections, enhancing the practicality of the installation.

BLOCK DIAGRAM

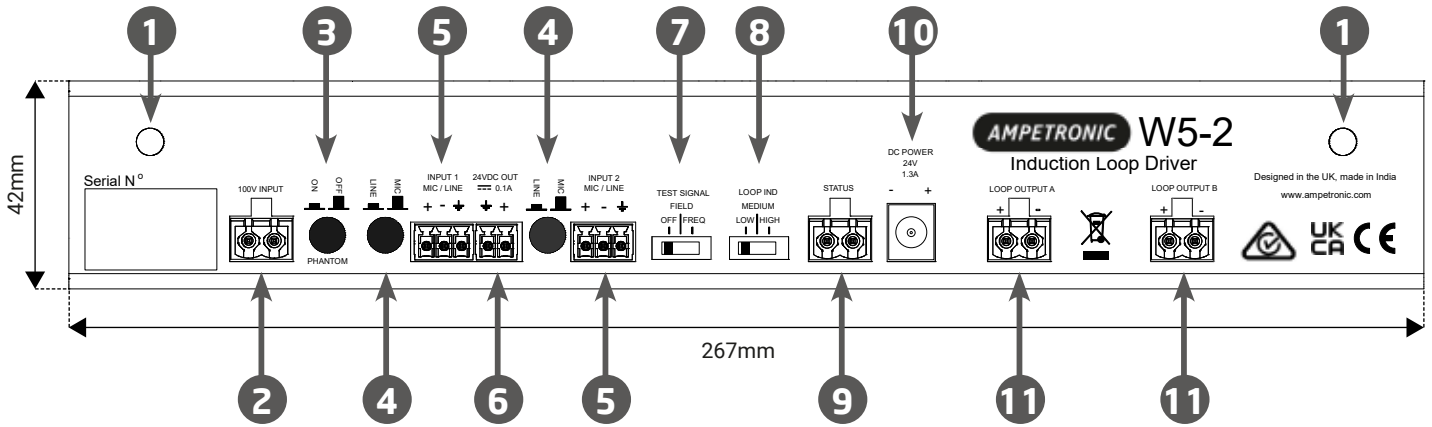


Wall Mounting Dimensions



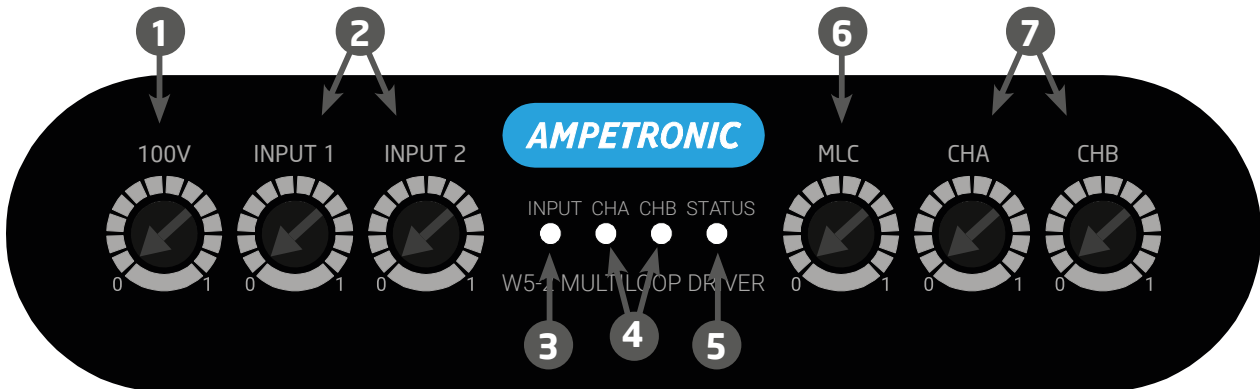
1. **Keyhole Mounting Holes:** 8.6/5mm x 4
2. **M4 screws and washers (provided) securing cable tray to main unit**
3. **M4 stud (nut and washers provided) for grounding if required**
4. **Suggested mounting position for PSU**
5. **Knock out positions for 20mm fittings/grommets (not supplied)**
6. **Alternative cable entry under 'flap'**

CONNECTIONS



- 1. Cable Tray Securing Points**
- 2. 100V Input:** Attenuated input for 100V line signals.
- 3. Phantom Switch:** Applies 24V phantom power to both inputs.
- 4. Mic/Line Switches:** Push switches to set signal level of input 1 & 2.
- 5. Inputs:** Balanced mic or line inputs.
- 6. DC Output:** 2 pin connector supplying 24V for ancillary units.
- 7. Test signals:** Switch to enable test tone output.
- 8. Loop Inductance Switch:** Adjusts frequency response according to load inductance.
- 9. Status:** 2 pin normally closed relay contacts. Opens to reflect fault conditions.
- 10. DC Power:** Socket for connecting the provided PSU only.
- 11. Loop Outputs:** 2 pin connectors for loop feed cable.

CONTROLS & INDICATION



- 1. 100V Gain:** Level control.
- 2. Input 1 & 2 Gain:** Level control.
- 3. Input Indicator:** Indicates input signal in AGC (green) or overload (red).
- 4. Loop Output Current Indicators:** Indicates current (green) and clipping (red).
- 5. Status Indicator:** Indicates power (green) or fault (red).
- 6. Metal Loss Control:** Level control.
- 7. Loop Output Current Control:** Level control.

INSTALLATION

Tools

A magnetic field strength meter (e.g. Ampetronic FSM or Loopworks R1) is vital to check that the loop system is providing the desired level of performance.

A small flat bladed screwdriver is necessary to adjust the controls and secure cables into the screw terminals.

A PH2 driver is required to open and close the lid

Location

The unit is designed for wall or panel installation, with a detachable lid which is secured by four Phillips No 2 screws. The unit may also be used free standing.



The location must provide adequate ventilation for the unit. If the unit is installed in an enclosed environment, sufficient airflow into the enclosure must be provided through vents, fans or other means.

Contact Ampetronic for advice on cooling requirements for your installation.

Assess the condition and structure of the wall and use suitable screw fixings for the weight of the unit. Use all 4 mounting holes - details are shown in 'Wall Mounting Dimensions' on page 3.

Once the location is decided remove the lid by unscrewing the 4 securing screws. Use the base



section to mark the wall for drilling.

If supplied from the building mains supply without a disconnect device the W5-2 is classed

CONNECTION & SET-UP

It is advised that the loop system is initially set up using a local audio source such as a CD player, which is not connected into any other system. This avoids the complication of ground loops and feedback etc, whilst the unit is set up.


The following procedure assumes cables have already been installed to the site where the unit will be mounted and that the **AC power feed is isolated**.




1. Ensure a suitable loop layout has been installed. See <https://www.ampetronic.com/w52> to download pre-prepared designs for small rooms. If these are unsuitable for your space use Loopworks Design or contact Ampetronic support for a bespoke design.
2. Run a twisted pair feed cable between the termination point of each loop circuit and the intended driver location.
3. Install suitable microphones as required and run audio input cables from all sources to the intended driver location.
4. If using cable tray knock out required cable entry points and fit suitable grommets or glands.
5. Mount the unit in its intended position and refit the lid. Contact Ampetronic for advice on cooling requirements for your installation.
6. Turn all controls fully anti-clockwise.
7. Connect the loop feed cables into the provided 2 pin 5mm terminal blocks and insert into the loop outputs.
8. Connect the signal inputs appropriately:

Microphones (balanced only): Suitable dynamic or condenser microphones. Select phantom power as required. Connect to the provided 3 pin 3.5mm terminal blocks and insert into INPUTS 1 & 2 (with mic/line selector switch in the mic. position) see Connections drawing.

Line Input Sources: For feeds from PA or AV systems and other line level signal sources. Ensure a mono summed, balanced connection is available. This may require the use of a 3rd party adapter such as a direct box. Make sure phantom power is turned off. Connect to the provided 3 pin 3.5mm terminal blocks and insert into INPUTS 1 & 2 (with mic/line selector switch in the line position) see Connections drawing.

100V line: Connect to the provided 2 pin 5mm terminal block and connect to 100V Input (see  Connections drawing). This input may have a hazardous voltage on its terminals and must only be connected by a suitably qualified person.

9.  Connect the provided DC PSU to the DC input (see Connections drawing) and the mains plug into a suitable outlet.

Ensure all relevant tests of AC supply have been carried out before turning supply on.

10. Turn on AC power feed. The STATUS LED will illuminate green. If the LED fails to illuminate consult the **Troubleshooting** section.

11. Set the Loop Ind switch to the right position for the amount of cable used in your loop installation. Refer to details in Technical Specifications or on design documentation.

12. Set the Test Signal switch to the middle “Field” position. Turn the CHA and CHB output current controls clockwise until the CHA and CHB output current indicators light up green.

13. The loop system should now be providing a magnetic field inside the area of the loop. Use a Field Strength Meter or Loopworks R1 to measure signal levels. Field strength should achieve 0dB +/-3dB re. 400mA/m in all intended listening positions.

Adjust the CHA and CHB controls until this performance is achieved. In most cases the two output channels should be set to the same level.

Once the correct field strength level is achieved the CHA and CHB controls should NOT need re-adjusting.

14. Set the Test Signal switch to the right “Freq” position. The driver will now be outputting 3 sinewaves simultaneously at 100Hz, 1kHz and 5kHz in order to measure the frequency response of the system.

With a Field Strength Meter adjust the receiver height until 0dB is measured in the 1kHz setting, then check the signal level at 100Hz and 5kHz, these should both be within +/-3dB of the 1kHz level. If 5kHz is too low turn the MLC control clockwise until a flat frequency response is achieved, making sure that the 100Hz level does not drop below -3dB.

15. If not already done so, steps can now be taken to integrate the W5-2 into a PA / mixer arrangement following standard audio techniques. If any unusual effects are experienced refer to the **Troubleshooting** section.

NOTE: Ideally, each input signal level should be set to just illuminate the AGC LED with the quietest level of input likely to be used. This will maximise the dynamic range of the system and ensure satisfactory performance.

16. Repeat the above procedure for each input used. When adjusting each input, make sure the signals are removed from the other inputs. This ensures that all signals are set to equivalent loudness and drive the AGC properly.

TROUBLESHOOTING

STATUS LED not illuminated

Check the provided PSU is correctly attached to the unit.

Check its mains cord is correctly attached and in good condition.

Check the mains cord is plugged into a suitable outlet and that it is turned on.

Check the provided PSU is providing power. This can be checked with a multimeter in Volts DC mode on the barrel connector of the PSU, centre positive. 24V dc should be seen.

STATUS LED illuminated RED

Check loop cables are connected and terminated correctly.

The unit could be overheating (which will also result in reduced or no current). Reduce the current or turn off and allow to cool. Ensure that the unit is installed in a location with sufficient ventilation.

Check load is correctly rated for the unit.

Turn power off and on again – in extreme circumstances the PA amplifier can latch in a fault condition leaving the STATUS LED illuminated Red. In this case no current will be delivered.

INPUT LED not illuminating

Check input connections.

Check TEST SIGNAL switch is Off.

Ensure the appropriate control (INPUT 1, INPUT 2, 100V) is turned up. Check there is sufficient signal level for the required input.

Check MIC/line switches are in the correct position.

INPUT LED illuminating RED

Check input signal level is appropriate for the input used.

Check MIC/line switches are in the correct position.

Adjust the appropriate control (INPUT 1, INPUT 2, 100V) to reduce the input level.

CHA or CHB LED not Illuminating

Check the INPUT LED is illuminating.

Check the CHA or CHB controls are turned up sufficiently.

Ensure the STATUS LED is illuminated green.

Check loop cables are connected and terminated correctly.

Check the loops are not open circuit, short circuit or connected to earth (see instability or high frequency noise section of Troubleshooting).

The unit could be overheating (which will also result in reduced or no current). Reduce the current or turn off and allow to cool. Ensure that the unit is installed in a location with sufficient ventilation.

CHA or CHB LED Illuminating RED

Check loop cables is connected and terminated correctly.

Check the loops are not open circuit or connected to earth (see instability or high frequency noise section of Troubleshooting).

Check loop inductance is within spec.

Low magnetic field strength

Due to insufficient current or excessive metal loss. Turn up CHA and CHB controls if possible. If these are already turned all the way up the loop layout may not be appropriate for the environment, or the loop driver may be underpowered. Contact Ampetronic support for advice.

Instability or high frequency noise

1. It is possible for the loop cable to be grounded under fault conditions, resulting in instability which may sound like high frequency noise, buzz or whistling.
This fault is easy to determine. Simply disconnect the loop cable from the amplifier and test with a resistance meter between either of the loop wires and a good earth point such as a metal radiator. The meter should show no connection or greater than 10 megaohms. Any lower reading indicates a failure of the loop cable insulation and you will need to either repair or replace the loop cable.
2. Instability can be caused by using poor quality signal cables, long unbalanced (2-wire) signal runs to the inputs, or by running input cables in close proximity with the loop wire over an appreciable distance. Loop amplifiers are capable of delivering high currents at audio frequencies. If the loop cable is run close to sensitive signal cables it may be possible to induce a signal back into the input of the amplifier causing feedback. Cable runs and loop wires should be kept well apart from each other. To avoid interference maintain a separation of at least 300mm.
3. Instability can cause the amplifier to run hot and may result in an overheat condition (see **CHA or CHB LED not illuminating** section).

Interference

1. Background magnetic field signals or interference may be present in any location and may not be anything to do with the loop system. Monitor this with a loop receiver (such as an ILR3, ILR3+ or Field strength meter). If the interference is still present with the loop system switched off, then you need to locate and eliminate the source of the interference before switching the loop system back on.
2. Magnetic fields can induce currents into any low impedance electrical path or loop. Audio or video systems with multiple earths may experience pick up of the loop signal. Check entire sound system for evidence of loop signal, and trace source of pick up.
3. Under certain circumstances, the loop signal may appear as jagged lines or hum bars on a CCTV picture. This could be due to running CCTV (low impedance unbalanced 2-wire circuit) cables in close proximity to the loop cable. Separate the loop cables to reduce the effect.
4. Remote (and apparently unconnected) PA systems can sometimes pick up loop signals. This is usually because the loop cable becomes damaged (see point 1 of **Instability**) or induces signals into the remote system through long unbalanced cables. Always run long audio signal cables as 3-wire balanced circuits and keep away from loop cables.

ACCESSORIES

Details of all products and services provided by Ampetronic can be found at www.ampetronic.com.

OPERATION INSTRUCTIONS

The W5-2 unit can be left connected and powered on indefinitely. It should not require post commissioning adjustment of the controls during normal operation.

A visual check of the status LEDs can be performed to ensure that the unit is powered up and has an input signal.

Periodic system testing can be performed using the Maintenance Manual contained in this Handbook to ensure the amplifier and loop are functioning correctly.

TECHNICAL SPECIFICATIONS

INPUTS & SIGNAL PROCESSING	MIC	Line	UNITS
Input figures quoted at maximum front panel gain control setting.			
INPUT 1 & 2: (mic/Line) 3 way, 3.5mm phoenix, balanced, suitable for up to 600Ohm microphones or line level.			
Input impedance	8,700	8,700	Ω
Sensitivity	-69	-45	dBu
Overload	-33	-9	dBu
100V: Isolated 100V line input			
Input impedance	120,000		Ω
Sensitivity	+11		dBu
Overload	+47		dBu
AGC: Compression of signal indicated by green INPUT LED when active and RED when overloaded.			
Input range	>36		dB
Output range	±1		dB
Min. input level for AGC	See sensitivity		
Attack time	3.5		ms
Decay time	1.4		s
METAL LOSS CORRECTION: Specially designed adjustable filter to compensate for the effects of metal loss. Gain @ 1kHz remains constant.			
Min. slope	0		dB/oct.
Max. slope	+3		dB/oct.
LOOP IND: High shelf filter options to compensate for the effect of loop inductance on the class D output stage			
Low	No effect		
Med	3dB max starting from ~1kHz		
High	4.8dB max starting from ~1kHz		
Test Signals: Internally generated signals for commissioning which when activated interrupt the input audio signal.			
Off	Audio signal passed		
Field	Single 1k tone		Hz
Freq	Combined 100, 1k & 5k sine tones		Hz
DC Power			
Power figures for reference only. With unit set for maximum output with the input in AGC. Only use the provided DC power supply.			
Voltage	24		V
Current idle	0.28		A
Current pink noise	1.3		A
Current sine	3.2		A

TECHNICAL SPECIFICATIONS

OUTPUTS		UNITS
LOOP OUTPUT: 2x 2way, 5mm, phoenix.		
Voltage	7.8	V _{RMS}
Current	5	A _{RMS}
Continuous pink noise	2.5	A _{RMS}
THD +N (1kHz, sine, max output)	0.5	%
Maximum loop resistance	0.6 (at maximum current)	Ω
Frequency response	±3dB, 100 to 5000Hz	
DC OUT: 2 way, 3.5mm, Phoenix. Fuse protected output for ancillary devices.		
Voltage	24	V
Current	0.1	A
Status: 2 way, 5mm, Phoenix. Volt free relay contacts indicating fault condition when open.		
Contact rating (resistive load)	12A, 125Vac 10A, 250Vac 10A, 30Vdc	
PROTECTION FEATURES		UNITS
Thermal Protection: If the PA amplifier reaches a pre-determined level the output current will be gradually attenuated followed by shutdown.		
Output attenuation Unit shutdown. (Requires power cycle to recover)	Max -4dB @ 90 PA chip junction temp>155 °C	°C °C
DC input over-current	Output attenuation	Max 4dB >5A dc input
Output over-current	Unit shutdown. (Requires power cycle to recover)	>10A loop current
PHYSICAL CHARACTERISTICS		UNITS
Dimensions: Width	270	mm
Height	152	mm
Depth	42	mm
Weight	1.1	kg
Operating temperature	-10 to 40	°C
Ingress protection rating	30	IP

WARRANTY

This product carries a five year parts and labour warranty from date of shipment from Ampetronic. To qualify for the five year warranty, the product must be registered at www.ampetronic.com (products/warranty), without which the warranty will be valid for two years only.

The warranty could be invalidated if the instructions in this handbook are not followed correctly, or if the unit is misused in any way.

DECLARATION OF CONFORMITY

Manufacturer: Ampetronic Ltd.
Unit 2, Trentside Business Village
Farndon Road
Newark
NG24 4XB

Declares that the product:

Description: Induction Loop Driver

Type name: W5-2

Conforms to the following Directive(s) and Norm(s):

Directive 2014/30/EU

EMC: EN 55032:2015 Emission
EN 55035:2017 Immunity

Directive 2014/35/EU

Safety: EN 62368-1:2020

Directive 2011/65/EU RoHS

Date: November 2023

J.R. Pieters

Managing Director

Ampetronic Ltd

MAINTENANCE MANUAL

Overview

1. This procedure is for checking an induction loop systems (otherwise known as a hearing loop, T-loop or 'AFILS') performance against the IEC 60118-4: 2006 Standard.
2. The procedure takes into account how the system is actually used. You will need access to the induction loop amplifier 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 all the steps detailed to properly to check the system.
5. In the event that any step of the process shows a problem, and you are not able to resolve the problem as instructed, the issue should be reported for further action.

Equipment required

You will require:

- A field strength meter (FSM), Loopworks R1 or professional audio analyser that reads 0dB at 400mA/m field strength, and headphones to listen to the loop system.
- If adjusting the controls, a small Phillips screwdriver and a small terminal screwdriver / trim tool.

NOTE: If the installed audio inputs are not available to be used, you cannot complete the test BUT you will be able to identify most problems using the integrated test signals.

Product Installation - Visual Inspection

1. The unit must be securely mounted in a location not susceptible to water ingress or excessive dust/dirt.
2. The installed unit should not have any sign of physical damage
3. The following connections should be present and correctly terminated at BOTH ends of the connection (where this can be inspected):
 - 24V DC POWER
 - LOOP OUTPUT A and B (feed cable to loop)
 - Installed audio inputs connected to INPUT 1, 2 or 100V. At least one connection required.

Environmental Magnetic Noise Check

1. Use a Ampetronic FSM Field Strength Meter or Loopworks R1, held vertically at about 1.2m above floor level for seated positions or 1.7m for standing positions above floor level, in the centre of the looped area. Ensure the loop driver is powered off. The Field Strength Meter should be set to 'background noise' mode.
2. Check that the reading is not above -22 dBA on the FSM, ideally below -32 dBA. It may occasionally be higher for a very short time, typically during a nearby tram movement, but in the 'Listening Check' (later) this must not impair intelligibility of the loop signal.

Basic Functionality

1. Apply power to the unit.
2. Initially, the STATUS and INPUT lights should be lit.
 - The CHA and CHB light should not be lit after a very short time.
 - The STATUS light should remain illuminated at all times.
 - The INPUT light will fade and go out after about 20 seconds if there is no audio input active.
3. Activate normal audio signals, this may be someone speaking into a microphone or playback of program audio.
 - If this is not possible, set the Test Signal switch to the middle "Field" position.
4. When the audio input signal is active, check:
 - The AGC light is lit, and the CHA and CHB light is lit on peaks of signal (may only be occasionally lit)

Magnetic Field Strength Check

1. Identify the area of enclosed by the loop
 - Refer to steps 12 - 14 of the Connection and Set-Up section of the handbook.

