

# SAM-A1 Stereo Audio Valve Amplifier Owner's Manual

## READ BEFORE OPERATING THIS EQUIPMENT



# 1. Introduction

Congratulations on the purchase of your SAM-A1 stereo valve amplifier, we hope you enjoy the sound quality and its appearance.

## READ THIS MANUAL BEFORE USING YOUR AMPLIFIER!!



**WARNING Lethal Voltages!**



**WARNING Valves get HOT!**

Whichever variant you have chosen, your SAM-A1 will provide you reliable and impeccable music reproduction for years to come and with the correct maintenance and service, can provide a lifetime of listening pleasure.

This manual tells you about the precautions you must take in using this valve amplifier and how to set up, connect and use your SAM-A1 amplifier safely.

The SAM-A1 must only be used for its intended use; this is defined as follows:

The SAM-A1 is intended for use as a stereo audio amplifier for indoor, domestic use only, being operated within the specifications stated in this document and on the rear of the equipment. The unit is intended for use when all earthed, protective covers are in place and with all the valves correctly installed. Only fuses supplied with the equipment or replacements of identical performance and rating are to be used.

FSL will not take any responsibility for any injury or damage to anything or anyone, the equipment or any adjacent or connected property or equipment if the instructions and specifications in this manual are not strictly adhered to.

### 1.1. Issue History and revisions

Version	Release Date	Reason For release
1	April 2020	First Issue
2	June 2020	Notes on use of Bluetooth receivers added
3	June 2020	Improved warnings for temperature and Voltage added symbols
4	June 2020	Clarified o/p impedance and Mains input range, selection and consequences
5	Aug. 2020	BS7671 lower mains requirement corrected, mains selection clarified 5.1 default 240Vac

This specification liable to change without notice, the latest version will be available for download from [www.fireworksolutions.com](http://www.fireworksolutions.com). This document master is held electronically.

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### 1.3. Glossary/Abbreviations

ac	Alternating Current
dc	Direct Current
FSL	Fireworks Solutions Limited
HBC fuse	High Breaking Current (also known as high rupture current) fuses are designed to break the circuit, without breaking themselves, at currents much higher than the rated fuse blow current.
RoHS	Restriction of Hazardous Substances regulations 2019
WEEE	Waste Electrical and Electronic Equipment 2002
Vac rms	Voltage Alternating Current Root Mean Square value = $V_p \div \sqrt{2}$
Vdc	Direct Current Voltage (equivalent to the rms value of the Vac)
Vp	Maximum voltage amplitude in either polarity from the mean

### 1.4. Reference Documents

#### 1.4.1. Compatible/tested Valves.

For the latest information on compatible valves and current stock and availability, please refer to our website - [https://www.fireworksolutions.com/valve\\_amp.html](https://www.fireworksolutions.com/valve_amp.html)

## 2. Safety and Warnings

### 2.1. Lethal Voltages



**WARNING Lethal Voltages!** Valve amplifiers invariably use high voltages, both Direct Current (DC) and Alternating Current (AC) that are available at high currents: **the combination can kill you**. It is your responsibility to operate in a safe manner at all times to avoid electrocution of you and others and to make the products safe to use.

Modifying valve amplifiers is **DANGEROUS** there is no need for you to modify the SAM-A1 amplifier. Do not attempt to modify the equipment yourself! If you want to change the configuration of your SAM-A1 amplifier please contact FSL.

Our amplifiers are assembled to the highest standards, the configuration of every unit is recorded and each is fully tested before despatch/delivery. The SAM-A1 is CE marked and all aspects of the design relating to user safety are covered in this manual, supplied with the equipment and full details of the SAM-A1 conformance with the CE marking directives are recorded in FSL's Technical Construction File.

FSL accept no liability for any damage or injury sustained through, or as a result of the modification of the amplifier, or its use for anything other than the stated intended use.

### 2.2. High Surface Temperatures



**WARNING Valves get HOT! Up to 220°C<sup>1</sup>**. Do not touch the valves when they are on or until they have cooled down (at least ten minutes should be allowed between removing power from the amplifier and touching or cleaning/dusting the valves).

**DO NOT COVER.** It is recommended that at least 300mm be allowed above the top of the amplifier to allow free flow of air to take heat away from the valves. DO NOT locate it under flammable materials or materials likely to melt. The amplifier has vents on the underside and top surface of the enclosure to allow air to flow through the enclosure by convection. Ensure these are not blocked, i.e. ensure the amplifier is resting on a hard flat surface when in operation – and do not cover.

**Ensure the SAM-A1 is located where it cannot be reached by children or pets.**

**Never leave the amplifier unattended when it is switched on.**

It is normal for the metal enclosure of the amplifier to get warm, especially the top plate, which will be heated by radiation from the valves and components under the plate. The rear plinth is used to dissipate heat generated in the linear power supply and may get warm depending on the supply connected to the amplifier and its configuration.

<sup>1</sup> This is the specified maximum temperature that the glass bulb can achieve for the output valves (V2,3,5 and 6) if the valves are operated at the maximum specified ambient temperature for the valves and at maximum power.

### 3.1. Equipment Operating Specifications

**WARNING** Operating the SAM-A1 outside of its stated operating limits can result in premature failure of the equipment and in severe cases may result in the equipment overheating with a subsequent **risk of fire**. These operating specifications must not be exceeded.

#### 3.1.1. Power Supply:

Mains input: Fused IEC Plug  
 Voltage: 205 to 255Vac – internally selectable – this is NOT automatic. In the true spirit of old valve equipment, the unit must be set up for your mains voltage, see below.  
 Frequency: 48-62Hz  
 Power: Nominal 70W depending on configuration, maximum 150W.  
 Insulation: Class 1 Protective earthed enclosure.  
 Fuse rating: 20 x 5mm HBC fuse rated at 2.5AT (delay)  
 IP Class: IP20  
 Temperature: Min 0°C Max 40°C Operating and storage.  
 Humidity: 30 to 70% Relative Humidity.

The input voltage is compatible with BS7671, requiring a range of 230Vac +10% -6%, 216V to 253V. The SAM-A1 will operate from 205 to 255Vac in, the input range is internally selectable for the following supplies, with considerable overlap between the ranges: Blue is Neutral, primary Live winding wires as follows:

210 ±5V: Violet  
 220 ±5V: Grey  
 230 ±5V: Red  
 240 ±5V: White – **This is set as the default**; good for around 225 – 253Vac in\*  
 250 ±5V: Black

\*If the mains supply is too high for the selected input, the amplifier will get hotter (rear plinth), wasting energy. The valve heaters will be run hotter and depending on the valves chosen, maybe even too hot (this will reduce the life of your valves) – There is significant overlap between the input ranges but for optimum performance and valve life, we strongly recommend the mains input transformer winding is matched to your supply.

If the input is too low the regulators in the PSU may start to allow hum through to the speakers. The input range is selected by connecting the appropriate input winding of the mains transformer to the mains switch, with the alternative taps being terminated in female fast-on crimp connectors and cable-tied back to retain them out of the way, the primary wire colours are identified above. Input Voltage selection should only be performed by a competent technician capable of doing the job safely and leaving the equipment in a safe state for use; alternatively, see FSL service section.

#### 3.1.2. Signal Input

One pair of RCA Phono sockets; isolated from chassis.

Input impedance: 90 to 100kOhms.

Input sensitivity: 200 to 500mVrms for full power out (dependent on configuration).

#### 3.1.3. Signal Output

Two pairs (right and Left) isolated from chassis 4mm sockets with binding posts for wires.

Output impedance: 80ohms PASSIVE speakers only. It will work with impedances from 4 to 160ohms but the SAM-A1 output is balanced with an 80ohm load.

Output Voltage: Max 26.5V pk-pk at 11Wrms in to 80ohms (dependent on configuration).

Output Power: 8Wrms per channel (default) 16W peak (22.6Vpk-pk).

Bandwidth: 5Hz-50kHz -1dB at 1Wrms

Frequency response and distortion dependent on configuration.

Note that the 0V or negative of both the inputs and outputs is connected to 0V of the amplifier. By default this is connected to chassis and Earth of the Mains power socket via a 10 Ohm 3W Metal Film resistor. The SAM-A1 0V may be connected directly to Earth and Chassis if required, or via a different resistance value as required; alternative options are 0(zero) or 10kOhms.

### 3.2. Hazardous Voltages & Fragile Components

As specified in section 2.1, the equipment contains hazardous, potentially lethal voltages and must be fully isolated from the mains supply before removing any covers or unplugging any of the valves. (See also section 2.2; surface temperature warnings).



#### **POTENTIALLY LETHAL VOLTAGES INSIDE.**

**WARNING** DC voltages as high as 400VDC may be present inside the unit when in operation.

In addition to the hazard presented by the mains supply voltage, valves require hazardous DC voltages for their operation. These DC supplies are smoothed using reservoir capacitors that are capable of delivering significant short term current. The combination of high DC voltages and available at high currents can be **LETHAL**.

In normal operation, when used as intended, these hazardous voltages are not accessible to the user and the user is protected from them by a combination of insulation and earthed protection offered by the metal case.

The IP20 rating specifies protection against solid objects >12mm i.e. fingers from gaining access to hazardous voltages, the largest apertures are 5mm diameter vent holes around the valves and 4 x 20 mm ventilation slots in the lid and base. A standard test finger in accordance with IEC60529 cannot access any hazardous voltages through any of the apertures in the case. **DO NOT** insert any conductive object/tool in to any of the vents/holes in the case.

The equipment is not protected against moisture ingress. In the event of a spillage on to the equipment immediately isolate the equipment from the ac mains supply, then remove all connections to the amplifier and seek advice from FSL.

Do not operate the amplifier in an environment where there is high humidity, water or splashing with water is likely e.g. bathrooms or within 2m of a sink or tap.

All adjustments are to be made with the correct trimmer resistor adjustment tool. The correct tool has a metal blade that fits in the trim pot screw slot but a plastic handle that fully isolates the operator from the circuit. The correct tool is one of the following:

Vishay ACCTRITOB308 (RS stock number: 543-434)

Bourns H-90 (RS Stock number: 743-2479)

#### **Thermionic valves and safety**

**WARNING** the outer case of the Valves is made from Glass and they are **FRAGILE**.

If the valves are broken; the hazardous voltages will be accessible to the user/operator.

The unit must not be operated with missing or broken valves.

Inspect the equipment before connecting to a mains supply; if any of the valves appear damaged or is missing, disconnect the supply immediately.

**NEVER** remove valves while the equipment is connected to the mains ac supply.



### 3.3. Mechanical properties

#### 3.3.1. Dimensions and Mass

Dimensions: 382mm Wide x 341mm Deep x 77mm high

This excludes the connectors to the rear and 60mm should be allowed for connections to the amplifier at the rear.

The height excludes the feet (depending on which feet are fitted) the standard rubber feet add another 3mm to the height of the enclosure. There will always be an air gap under the amplifier to allow air to circulate through the unit.

The Height also excludes the valves which depends on the configuration used; regardless of which valves are fitted, it is recommended that at least 300mm be allowed above the top surface of the amplifier for heat dissipation; see section 2.2.

The mass of the assembled unit is: 7.75kg  $\pm$ 0.25kg.

According to HSE guidelines for Manual Handling, this is less than the maximum recommended mass for a one-person lift. The unit has no moving parts that can cause injury or trap fingers as such the SAM-A1 amplifier does not fall under the remit of the Mechanical Directive for CE marking.

The mass of the unit is sufficient that the unit may cause injury and may suffer damage if it is dropped e.g. on to a hand or foot. Care is to be taken when lifting or moving the unit to avoid dropping it.

#### Structural integrity

The unit should never be moved while the unit is connected to anything. Due to the mass of the components inside the unit, the unit will survive a 25mm drop test and remain safe but may become aesthetically damaged.

## 4. Getting to know the SAM-A1

### 4.1. Connections and controls

On the rear of the amplifier you will find the following connections:



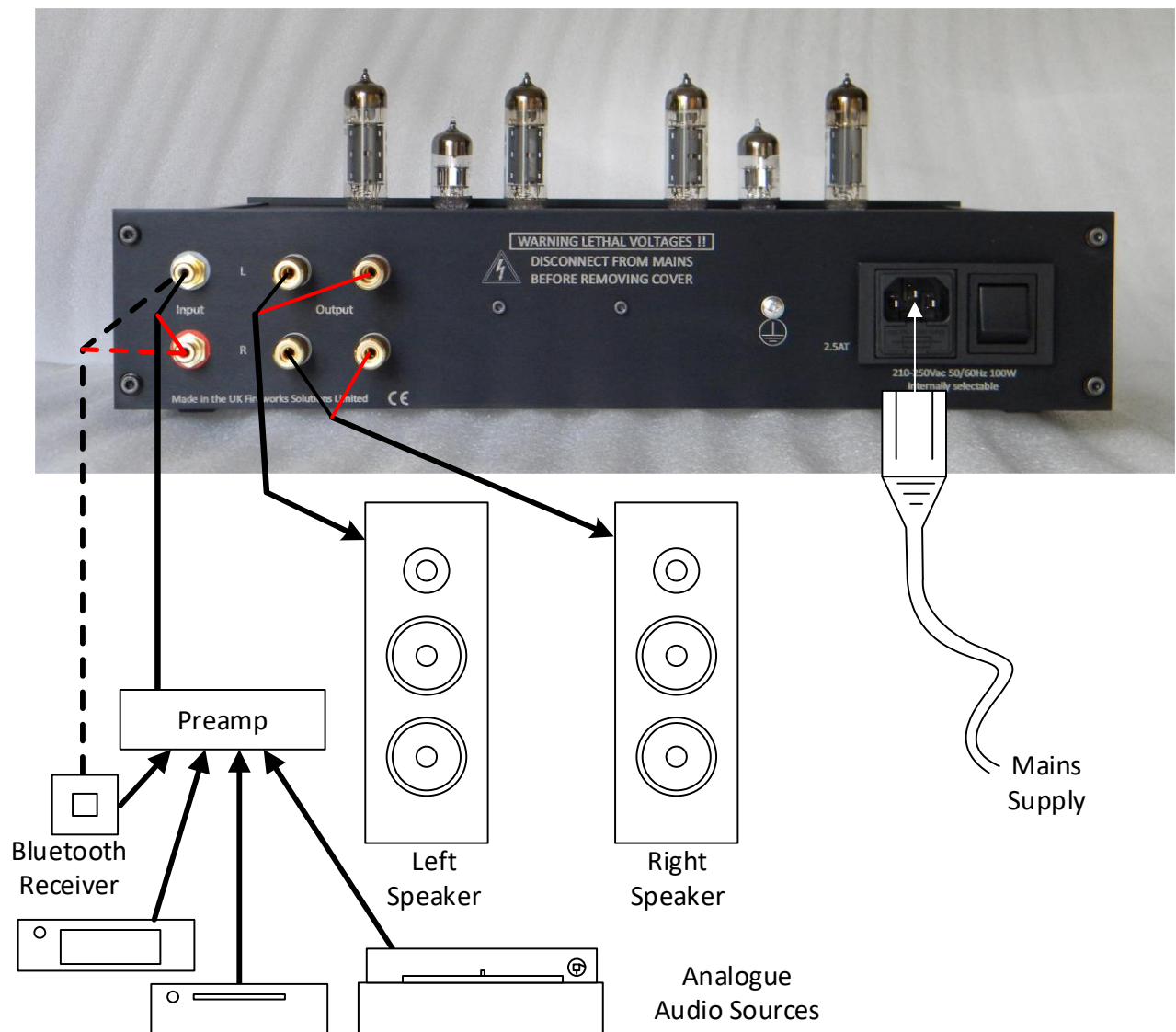
- 1) Mains supply input socket (a 90 degree plug reduces the space needed behind the amplifier).
- 2) Power Switch (shown here in the OFF position, switch down is ON).



- 3) A pair of input sockets (RCA) for connection to your pre-amplifier or direct to your source.
- 4) Two pairs of 4mm sockets/wire termination posts for connection to your loudspeakers.

On the front of the unit there is the volume control. Fully anti-clockwise = zero volume, turn it clockwise to increase the volume – always start at minimum volume position when switching on for the first time!

## 4.2. Connecting the SAM-A1 to your other audio equipment:



Note the audio source connected to the inputs must be a big enough amplitude/voltage to drive the amplifier, i.e. a turntable/record player with an output of only a few tens of millivolts will require a preamplifier to get the signal up to the 250 – 500mV input required by the SAM-A1 amplifier.

If your audio source already has a compatible signal it may be connected directly to the SAM-A1 inputs as shown with the dotted lines.

Bluetooth connectivity to your existing devices (e.g. phones, tablets) can be achieved by using an external Bluetooth Audio receiver. We have only tried one – an MPOW BH070. This device worked as advertised and did not add any significant hum or hiss even when plugged in to a USB plugtop charger.

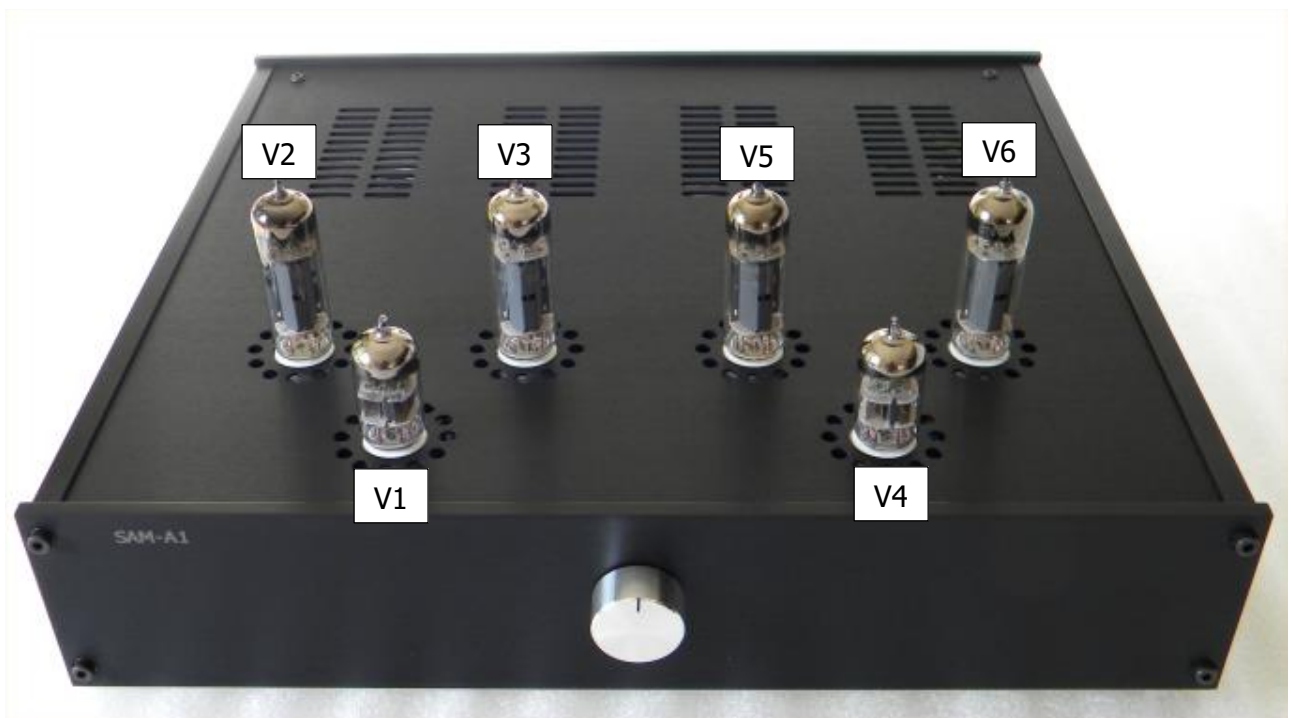
## 5. Installing the valves

If your SAM-A1 amplifier did not come with the valves installed; see section 7 for instructions on how to fit a valve to its base.

The valves will all be in boxes labelled with their position in the amplifier, valve V1, V2, V3, V4, V5 and V6.

(Each valve will also have a unique number that will be written on the box and written on the glass between the pins at the base of the valve – just in case the valve and its box get separated/mixed up).

Remove the valves one at a time from their box and insert them in their defined locations as per the picture below.



If the valves are correctly installed, the base of the valve will sit flush with the top of its ceramic socket there will be no pins (or virtually no pins) visible and the valve will be vertical – see next picture.

Correctly installed valves:



## 6. Using the SAM-A1 amplifier

Once the amplifier has been connected as per section 4.2 and the valves are fitted as per section 5, your amplifier is ready to use!



Ensure the volume control is at minimum, see picture above and turn on the amplifier. Within 10 seconds you should see all the valves glowing orange (and if you look carefully – probably some blue too – remember they get hot!).



Within about 20-30 seconds from switch on the amplifier will be starting to work (it can take up to 5 minutes to reach full specification).

Select your audio source (pre-amplifier) or press play etc. to start the music/audio source.

Turn the volume control up (clockwise) until the desired listening volume is achieved.

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## 7. Installing or removing valves

Before carrying out any work on the amplifier the unit must be switched off, isolated from the supply and allowed to cool.

### **HANDLE VALVES WITH CARE!!!**

Valves are glass and fragile; even if they are not visibly damaged, incorrect handling can result in the breaking of their hermetic seal allowing air into the valves resulting in their untimely demise.

Dropping valves is also a bad idea as a fall on to a hard surface can dislodge the internal mechanical arrangement of the valve resulting in premature failure and internal short circuits which can damage the amplifier.

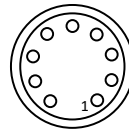
If you have dropped your valves during the installation – do not switch on your amplifier; contact us and we will arrange for your valves to be sent back to us to be tested before you fit them.

Follow the following steps to remove and insert valves from their bases in the amplifier.

#### 7.1.1. How to insert a valve into its base.

Use suitable gloves or wrap a microfiber cloth around the valve (to avoid marking the valve and to protect against the unlikely event that the glass envelope breaks).

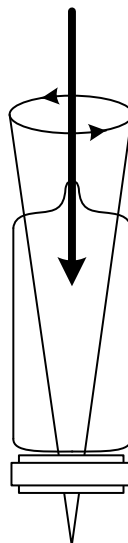
Valve base – top view (note pin 1 identified)



Note that there is only one way that a valve can be inserted in to its socket/base (see image of valve base). Holding the valve close to the base, align the pins with the sockets in the valve base and push the valve firmly in to its base with a small circular motion as illustrated.

Ensure that the valve pins are fully inserted in their sockets (no pins visible) and that the valve is vertical/perpendicular to the valve base.

Inserting a valve in to its base.



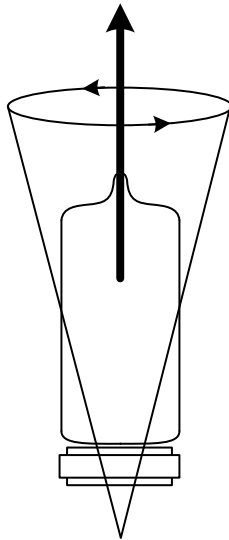
### 7.1.2. How to remove a valve from its base

Use suitable gloves or wrap a micro-fibre cloth around the valve (to avoid marking the valve and to protect against the unlikely event that the glass envelope breaks).

Holding the valve close to the base, pull the valve firmly, steadily, upwards out of the socket while gently, slowly rotating the valve in conical motion

If the valve glass envelope is damaged, care is to be taken to avoid cutting yourself on the glass. Remove the glass using a suitable cloth and/or gloves. Dispose of the broken valve by wrapping it in several layers of paper, sealing it with sticky tape and then dispose of the broken valve in domestic waste. Do not recycle.

Removing a valve from its base.



### 7.1.3. New valves or replacement valves of the same type

If for any reason you wish or need to change the valves in your SAM-A1; it is imperative that you note the following:

Valves should always be replaced as sets i.e. a pair of input valves and a quad of output valves. Not doing so may make it very difficult or impossible to balance the amplifier and as the new valves age their characteristics will change more rapidly than the older valves requiring much more frequent re-tuning of the amplifier.

If replacing the input stage valves only, the output valve bias setting should not need adjustment. If replacing just the output valves it may be possible to leave the input valve adjustments alone, but this is a lot less likely to be successful. It is always better to completely reset the amplifier settings and retune the amplifier. (See Section 8.2). Replacing valves in an amplifier without re-tuning it will very seldom achieve good results and in the worst case may result in damage to the valves and/or premature failure of other components in the amplifier. Please contact FSL for advice before attempting this operation.



## 8. Routine Maintenance

The valves are made from glass and they are fragile; if they are smashed or damaged then dangerous voltages may be accessible if the unit is turned on. This is not classified as normal operation as intended.

Refer to the safety and warning section of this document. Potentially lethal voltages are accessible if the unit is operated with the covers or removed (or if the glass valve envelopes are damaged).

Before carrying out any work on the amplifier the unit must be switched off, isolated from the mains supply and allowed to cool

### 8.1. Cleaning

Before carrying out any work on the amplifier the unit must be switched off, isolated from the supply and allowed to cool.

#### 8.1.1. Cleaning the case

Marks on the case e.g. fingerprints should be removed with a dry micro-fibre cloth. Particularly stubborn marks may be removed using a damp cloth e.g. baby wipe followed by a dry microfiber cloth to dry the surface. If using a damp cloth, do not clean inside the diameter of the cooling vent holes around each valve base; keep moisture away from the holes and valve bases. If there is any doubt that moisture has come in to contact with the valve bases, remove the valves and allow the unit to dry in a warm dry environment for 24hrs before re-fitting the valves or applying power.

White spirit on a cotton cloth can be used (sparingly and occasionally) to remove stubborn marks and greasy finger prints – always rub in the direction of the grain.

#### 8.1.2. Cleaning the valves

The valves are glass and they are fragile, In addition, note that the gold/ink labelling on the valve is very delicate.

### **DO NOT USE ANY CLEANING AGENTS OR SOLVENTS.**

The valves should not be touched in routine use and if they are then gloves (or a microfiber cloth) should be used to avoid leaving fingerprints. Fingerprints and dust may be removed with a dry micro-fibre cloth – apply the minimum pressure possible, especially over printed labelling on the glass.

Take particular care when using the cloth to clean the glass in the area of the labels and printed quality stamps (unless they are not important to you!). The durability of the identification markings and quality stamps is very variable depending on the manufacturer and date of manufacture of the valve. Removing the labels, any OEM quality stamps, or FSL markings from the underside of the valve will invalidate any warranty on the valves.

## 8.2. Servicing and configuration

FSL offer a comprehensive service for the SAM-A1 amplifier and we are happy to provide you a quote for work on your amplifier. Services offered include:

- Mains Input set up – matching the SAM-A1 to your domestic mains supply is important. Too low a supply setting and the amplifier may produce hum at the output; too high and the unit will waste energy, get warmer than it should and run the valves heaters hotter, reducing the life of your valves. If you do not know what your mains supply voltage is – a qualified electrician will be able to test it for you if your provider is unable to tell you what it is. Active sockets are also available to tell you how much power/energy an appliance is consuming and they often have a voltage readout (we can recommend a device for you but are unable to loan them out for liability insurance reasons). If you measure your mains supply with one of these active sockets, write down the voltage reading at different times of day for a few days and then send us the active socket and your readings, we will then check the reading on your smart socket and select the most appropriate mains input setting for your amplifier before delivery.

Failing that FSL can survey your mains supply for you during a visit to your installation and we will configure your SAM-A1 to your mains supply. This is only offered to UK mainland and may be subject to travel charges incurred.

- 6 month or annual re-biasing
- Annual service including valve check, complete set-up and re-calibration of the amplifier.
- Amplifier valve exchange – change the valves for a new set of the same type or a different grade – including a complete set-up and re-calibration of the amplifier.
- Amplifier valve roll - change either the input and driver or the output stage or all valves for a new set of a different type of valve - including a complete set-up and re-calibration of the amplifier.
- Amplifier re-configuration, e.g.
  - Change output stage: e.g. from small triode to large triode, from large triode to pentode or pentode as triode
  - Change input stage, e.g. from paraphrase inverter to cathodyneThis includes a complete set-up and re-calibration of your amplifier.
- Amplifier repair – in the very unlikely case that the amplifier develops a fault out of warranty or is damaged; we will assess your amplifier and quote to repair it, either to a functioning but as received condition or back to the as-bought condition.

If what you are looking for is not listed here, please contact us for assistance and advice (see the end of this manual for contact details).

Please note that Transportation to and from FSL must be in the original packaging or hand carried door to door. FSL will accept no liability for products that are lost or damaged in transit; customers are advised to choose a delivery method that offers adequate insurance against loss or damage. FSL will reimburse reasonable postage/delivery costs if the unit is returned for repair and FSL agree that the repair is covered by our warranty, see section 10.1.

### 8.3. Routine Output bias adjustment

This is the simplest of the routine maintenance activities. If you are in **any doubt** of your competence to perform this operation or you are not in the possession of/competent with the appropriate test equipment then **DO NOT UNDERTAKE THE TASK**; please contact FSL for our maintenance service.

#### **WARNINGS:**

As adjustments can only be made when the amplifier is on and the valves' temperatures have stabilised, this operation must only be performed by a competent person with the appropriate test equipment.

Trim pot adjustment tool

The correct, insulated tool must be used for all trim pot adjustments.

The correct tool is one of the following:

Vishay ACCTRITOB308 RS stock number: 543-434 OR Bourns H-90 RS Stock number: 743-2479

The output valves' bias should be checked at 6 month or 12 month intervals depending on the level of use. The objective is to ensure that the output valves are still biased correctly for the desired mode of operation of the output stage, to correct for any drift over time as the valves age through use and ensure that they are driving their output transformers and so the loudspeakers equally and linearly.

The bias current is measured by measuring the bias Volts on the 10R current sense resistors in series with the cathodes for each output valve, R19, R20, R47 and R48. 50mA reads 500mV. There are test points labelled Vb at the 3 o'clock position of each output valve (accessible with the top plate on). These are J51, J52, J53 and J54.

The bias current is increased by reducing the negative bias at the grids of the output valves. This is achieved by winding the trim pots at the 6 o'clock position of each output valve in an anticlockwise direction (accessible with the top plate on). These are RV7, RV6, RV13 and RV12.

If the output valves have been replaced, the bias setting will have to be done from scratch; all four bias adjusters. RV6, RV7, RV12 and RV13 should be set at their maximum bias voltage (minimum current) turn them all fully clockwise (clicking heard or 25 full turns) before the mains supply is applied.

If the bias is just being checked do not touch the adjusters and proceed with the check.

1. Connect the DMM negative to 0V, e.g. speaker output negative socket; set to read up to 2Vdc.
2. Connect and switch on the mains supply.
3. Wait 5 minutes before adjusting the valve bias currents.
4. Adjusting the bias:
5. The bias currents for V2 and V3 should be adjusted together; use the DMM to measure the dc bias Voltage for each valve as it is adjusted. In increments of no more than 100mV (10mA) at a time, increase V2 then V3 bias current until they are both at the desired value e.g. 250mV.
6. The bias currents for V5 and V6 should be adjusted together; use the DMM to measure the dc bias Voltage for each valve as it is adjusted. In increments of no more than 100mV (10mA) at a time, increase V5 then V6 bias current until they are both at the desired value e.g. 250mV.
7. Wait 5 minutes before checking the valve bias currents again,
8. Repeat steps 5 and 6 until all the output valve bias currents are within 5mV of each other and stable.

## 9. Troubleshooting

In the unlikely event that the SAM-A1 doesn't do what it is supposed to do, please check the following steps before contacting us.

Symptom	Probable Cause	Solution
The amplifier does not turn on (valves are not glowing)	Mains lead is not plugged in properly.	Check both ends of the mains lead are plugged in.
	Is it switched on? At the wall outlet and at the back of the amplifier.	Check the wall outlet switch and the power switch on the rear of the amplifier (see 4.1) are both on
	Fuse in the mains lead or in the amplifier mains inlet plug is blown or not fitted	The fuse are 5x20mm HBC 2.5AT
	Internal Fuse is blown	If you have checked/replaced both the
Valves are all glowing no sound is produced	Speakers not connected	Check the speakers are connected properly, both at the speaker terminals/connectors and at the amplifier, ensure the wire and not the insulation is in the terminal post if unterminated wires are used.
	Input not connected or turned on (e.g. Bluetooth receiver)	Check the input is connected properly at both ends and that the output of your source is connected to the input sockets on the SAM-A1 – i.e. the amplifier is not connected to another input or disused line output on your pre-amp. Follow Bluetooth receiver manufacturer's instructions.
	Input signal too small	Check your audio source does not have a level or output volume control and ensure it is not set low. Is your audio source compatible – is it capable of delivering adequate signal amplitude in to the SAM-A1 inputs? Check the specification of your audio source against section 3.1.2
Sound is coming out of the speakers but it is very quiet	Input signal not connected properly.	Check the input is connected properly at both ends and that the output of your source is connected to the input sockets on the SAM-A1 – i.e. the amplifier is not connected to another input or disused line output on your pre-amp.

Troubleshooting continued....

<b>Troubleshooting Continued</b>		
<b>Symptom</b>	<b>Probable Cause</b>	<b>Solution</b>
Sound is coming out of the speakers but it is very quiet	Input signal too small	Check your audio source does not have a level or output volume control and ensure it is not set low. Is your audio source compatible – is it capable of delivering adequate signal amplitude in to the SAM-A1 inputs? Check the specification of your audio source against section 3.1.2
	Volume control set too low level	Have you turned up the volume control to see if it makes any difference?
	Speakers not connected properly	Check the speakers are connected properly, both at the speaker terminals/connectors and at the amplifier, ensure the wire and not the insulation is in the terminal post if unterminated wires are used.
	Speakers too high impedance	Check the specification of your speakers against section 3.1.3. Perfectly acceptable volume ought to be achievable with speakers in the range 6 – 16 Ohms (but best performance and power will be achieved with the correct speaker impedance of 8 Ohms). Your speakers are not compatible if they have an impedance outside of this range
Sound is coming out of the speakers full volume cannot be achieved	Check the input signal is greater than 350mVrms!	If you are using a personal stereo or MP3 player e.g. phone as the source, they are often limited to less than 250mVrms to limit the volume produced by headphones. This can also affect the maximum signal that can be produced by a Bluetooth receiver. Talk to us about fitting the 6N2P-EV valves in the inputs V1 and V4.
Continuous or intermittent audible hum from the speakers when the volume control is on minimum	Input Mains is too low for the voltage selected inside the unit.	Mains input needs to be correctly selected inside the unit to match your domestic mains supply voltage– see section 3.1.1. Contact FSL.

If the amplifier is working and you have been through the fault table above and you are not happy with the sound quality then please contact us to see if we can help to resolve the issue.

## 10. Manufacturer Information and Warranty

### 10.1. Warranty

The SAM-A1 is covered by a 12 month limited Warranty against defects in materials and workmanship from the date of purchase. UK mainland only.

All FSL Amplifiers are fully tested and calibrated prior to delivery. Provided the SAM-A1 has not been modified in any way and has been used as delivered and as per the stated intended use, FSL will repair or replace the SAM-A1 if it develops a fault related to the manufacture or quality of the materials used in its assembly.

If your SAM-A1 develops a fault – please contact FSL immediately. We will then agree the best way to resolve the issue. If the problem cannot be resolved over the phone, then it is the customer's responsibility to arrange for the unit to be shipped safely and securely to FSL for assessment. FSL will accept no liability for damage incurred or loss of the unit in transit to our premises.

Once received, FSL will undertake a survey of the equipment and report findings to the owner before carrying out any work.

FSL will not be liable for the cost of transportation of the SAM-A1 to our premises for the purpose of undertaking the assessment and repair/replacement.

If FSL deem that the fault is a warranty issue, FSL will return the unit once repaired or a replacement unit at FSLs cost (mainland UK only).

### 10.2. FSL Contact details

Please direct all correspondence to:

Fireworks Solutions Limited  
93 Foxcroft Drive  
Wimborne  
Dorset  
BH21 2JY

[Will@fireworksolutions.com](mailto:Will@fireworksolutions.com)

Tel: +44(0)7747 863 196

## 11. CE Marking: Declaration of Conformity

### CE Mark Declaration Of Conformity

1. Equipment identifier: SAM-A1.
2. Name and address of the manufacturer: Fireworks Solutions Limited; 93 Foxcroft Drive, Wimborne, Dorset, BH21 2JY
3. This declaration of conformity is issued under the sole responsibility of the manufacturer.
4. Object of the declaration: the SAM-A1 stereo valve amplifier; covered by the SAM-A1 Technical Construction File, FSL0131.
5. The object of the declaration described above is in conformity with the relevant Community harmonisation legislation:
  - Low Voltage Directive (2014/35/EU)
  - Electromagnetic Compatibility Directive (2014/30/EU)
6. Specifications in relation to which conformity is declared:
  - EMC See manufacturer's statement. BS EN 55013 (emissions) and BS EN 55020 / BS EN 50082.1 (immunity).
  - EN 60950-1:2006+A2:2013 Information technology equipment. Safety. General requirements
7. Units are self-certified; see manufacturer's statements below, no third party intervention is required.
8. Additional information:

Signed for and on behalf of Fireworks Solutions Limited.

Signed: **Electronically – see latest revision of FSL0131** on, Date:

Will Bartlett-Hooker, Director.

## 12. RoHS and WEEE statement

While all of the components that are used to construct the SAM-A1 are RoHS and WEEE compliant; the technology of valves pre-dates these regulations and directives by some decades.

The RoHS and WEEE status of the valves themselves is unknown – so it is assumed that they are not compliant.

In addition, the technology operating conditions (high temperature and high voltage) do not suit the use of Lead (Pb) free solder – as such the unit is assembled using 60:40 Lead:Tin (Pb:Zn) solder.



The unit must not be disposed of in domestic waste but if the product is to be disposed of; please contact FSL first, we may want it back! If not, the unit must be taken to your local WEEE recycling centre – usually your local council run recycling centre.