

# **Valhalla Service Manual**

## **Valhalla power supply for LP12 Turntable**

**IMPORTANT – DO NOT FAULT FIND ON THE VALHALLA WHILE IT IS POWERED UP unless you have read the ‘Important Safety Information’ section below.**

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# Introduction

## About the Valhalla

**Introduced: 1982**

### **How it works**

At the heart of the Valhalla is a very low noise crystal oscillator, which produces a highly accurate square wave at an exact frequency.

As the LP12 motor runs at its quietest when driven with a clean sinusoidal waveform, a precision filter is employed in the Valhalla to remove harmonics from the square wave, leaving only a pure waveform.

The most uniform torque is delivered from the motor when both phases are driven at ninety degrees with respect to one another and this is achieved by a ninety-degree phase-shift network after the filter. The two resulting sinusoids drive an amplifier circuit, the outputs of which drive the two motor windings.

## About this manual

This manual is designed to help you as a Linn Retailer or Distributor to repair as many Valhalla faults at your repair centre as is practical and so provide the best possible service for your customer should a problem arise.

This is, however a Service Manual for the Valhalla and deals almost exclusively with faults on the Valhalla power supply. See also the LP12 Service Manual as certain faults that appear to be power supply problems are actually caused by the turntable.

If you have any suggestions or comments regarding this manual, please contact Paul O'Neill at Linn

Products Ltd:	By E-mail	PAULO@LINN.CO.UK
	By Phone	++44 (0) 141 303 5005
	By Fax	++44 (0) 141 644 4262 Marked for attention of Paul O'Neill

## Retailer & Distributor Obligations

Linn Specialist Retailers or Distributors are obliged to carry out the repairs in this manual under the terms of the contract & warranty agreements. You should return a faulty product to Linn for repair, only if the fault is not covered in this Service Manual. If a product, which is under warranty, is returned to Linn for repair and the fault is covered in the service manual, Linn may levy a charge and this charge should not be passed to the customer.

## How to use this manual

DO NOT FAULT FIND ON THE VALHALLA WHILE IT IS POWERED UP.... Before first reading the 'Important Safety Information' section below.

The main body of this manual, the fault table, is designed to be as quick and simple as possible to use when you are confronted with a faulty product and so it is arranged by fault symptom as the symptom is usually all that you will know about the fault.

If you are unsure about the meaning of any words or phrases, look in the Glossary.

Before embarking on any Service work, you should read the Service Procedures section, as there are certain procedures that must be followed in order to ensure the problem is resolved quickly and permanently

### **Table of contents & fault symptoms**

Look firstly at the table of contents and find the category that covers the symptom you are seeing, then look down the list of faults in that section until you find the symptom or symptoms that best describe the problem.



### Circumstances

Then simply follow the table along – the table specifies circumstances surrounding the fault symptom – e.g. whether the fault is likely to be intermittent or constant, if the fault only occurs within a range of serial numbers etc.

### Possible causes

The next column details possible causes – this is effectively the most important section, probably the main reason you are looking at this manual at all. There may be several possible causes for the symptom you have – it is worth checking out all of these (and bear in mind that there may be more than one fault). For some faults, simple checks are detailed that you can use to rule out the problem without replacing any parts, whereas for other faults, the simplest way to rule out the problem is to replace the component(s) listed

### Cure

Quite simply the action that you must take to cure the problem.

## Installation

### Important Safety Information

#### **Lethal Voltages Present – exposed live parts.**

We strongly advise that you do not to carry out any fault finding or other work on or near the Valhalla while it is powered up – see points below.

- If the Valhalla is connected to the mains, then **it is powered up** – DO NOT ASSUME that because the switch LED is off that the Valhalla is powered down.
- When the Valhalla is powered up, lethal voltages are present and easily accessible. While powered up, do not touch any part of the circuitry with any part of your body or with metallic or conductive objects.
- Some measuring instruments, such as an Oscilloscope, if grounded to the Valhalla can cause a massive power surge, which may blow the board and/or the test equipment.
- Only if you are very experienced with working on live circuitry and know exactly what you are doing should you attempt faultfinding on the live circuit.
- An isolated power supply must be used if work is being carried out on the live circuit to prevent power surges as explained above and to lessen the danger of lethal electric shock.

#### **Mains connections**

The LP12 to which the Valhalla is fitted **must** be earthed – both for Safety and functional reasons.

The wires in the mains lead are coloured in accordance with the following code:

Green & Yellow	:	Earth
Blue	:	Neutral
Brown	:	Live

As the colours of the wires in the mains lead of this appliance may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

The wire coloured **Green & Yellow** must be connected to the terminal in the plug that is marked with the letter **E** (earth) or the **Earth symbol**; or is coloured **Green** or **Green/Yellow**.

The wire coloured **Blue** must be connected to the terminal that is marked with the letter **N** (neutral) or coloured **Black**.

The wire coloured **Brown** must be connected to the terminal that is marked with the letter **L** (live) or coloured **Red**.



## Installation

DO NOT CARRY OUT ANY WORK ON OR NEAR THE VALHALLA WHILE IT IS POWERED UP – see 'Important Safety Information' section above.

Unpack the product & retain the packing for future transportation.

See LP12 Circuitry Installation Procedure for instructions on correct fitting etc.

As a Linn retailer, you are responsible for ensuring correct installation of the product. Read the Placement & Handling information below.

## Placement

### **Location & Environment**

Do not locate near electronic products that may transmit RF, such as microcomputers, fax machines, TVs etc, or connect them to the same mains socket as these devices. Also avoid close contact with the mains or signal leads of such products – careful routing of the cables may be required.

It is better if possible to keep the LP12/Valhalla separate from other products to prevent its operation being adversely affected by the heat and strong electrical field emitted by some products.

Avoid locations that have high humidity or the chance of the unit getting wet.

Avoid locations where there is a lot of dust.

### **Handling & general maintenance.**

No standard maintenance to the Valhalla is possible or advisable.

Always handle the LP12/Valhalla with great care.

Do not carry out any work with the unit powered up – see Safety Information above.

**ALWAYS** take anti-static precautions when handling the circuit board, as tiny static discharges from your body that you may be completely unaware of, can damage electronic circuitry and cause major problems.

Anti-static earth mats & wrist straps must be used when handling any of the circuit boards or any spare parts.



## Power-up problems

**Important – Do not carry out any work on or near the Valhalla while it is powered up before reading the ‘Important Safety Information’ section above**

Please note - It is very important to differentiate between “powering up” and “switching on” the Valhalla. We define “powering up” as plugging the Valhalla to the mains (if the Valhalla is connected to mains it is powered up). “Switching on”, on the other hand comprises of pressing the switch on the LP12 to start the platter turning.

This section deals with Power up only – Switch on is dealt with in the ‘Switch on’ section later.

Power up problems			
Symptom	Circumstances	Possible Cause(s)	Cure
Won't power up at all	Constant	Fuse blown in unit and/or in mains plug.	Replace fuse(s) with correct value & type. Fuse in mains lead should be 5A. Fuse fitted to Valhalla should be 1Amp
Won't power up	Constant	Fuse on Valhalla is missing or in wrong location (e.g. Valhalla is wired for 115V but fuse is positioned at 240V location)	Ensure fuse is fitted and is located correctly e.g. if used at 240V, locate in 240V location etc.
Won't power up	May be intermittent	Mains lead faulty or incorrectly wired	If you suspect a problem with the mains lead or its connections at either end, DISCONNECT FROM MAINS IMMEDIATELY and carefully check all connections. If cable is faulty, replace it – do not attempt to repair.
Won't power up	May be intermittent	Valhalla is wrongly wired for Mains supply being used – i.e. mains voltage is too low. (e.g. a Valhalla wired for use with 240V mains being connected to 115V mains supply.)	Check that the Valhalla is correctly set for mains voltage being used. If wrong, adjust to correct mains setting by moving the 'Neutral' (blue) mains connection and move the fuse to the correct location.
Won't power up  Some components on the board (near the fuse holder) may be blown	Only affects older spec Valhallas.  This fault only occurs if a resistor is fitted at location R1 – on later Valhallas, this was replaced with a Surge Guard Varistor (a round black component)	Early Valhallas would occasionally blow if there was a surge in the mains, destroying the Bridge rectifier – BR1, resistor R1 and the fuse.	Replace the 3 blown parts – available as a repair kit – Linn part no: VAL REPAIR. Note – the resistor is replaced with a Surge Guard to prevent re-occurrence.



Doesn't power up or Powers up (power LED may or may not be lit) but no function.	Intermittent - tapping or bumping the unit makes fault come & go	Bad connection either inside or outside the unit.	Find and eradicate bad connection. It may be something as simple as a connector not pushed fully home and may be easily visible. If fault is intermittent, see the Introduction to Fault Finding (section on intermittent faults), which can be accessed via the Product Information page of Linfo. If fault is not intermittent, it may be possible to trace the fault – again see Introduction to Fault Finding – Substitution & Isolation
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<u>Fuse blowing</u>			
Symptom	Circumstances	Possible Cause(s)	Cure
Fuse blowing	May be intermittent	Wrong type of fuse fitted	Replace fuse(s) with correct value & type. Fuse in mains lead should be 5A. Fuse fitted to Valhalla should be 1Amp
Fuse blowing	Probably random & sporadic	Mains surges	Consult an electrician or your power company
Fuse blowing	Probably constant	Valhalla is wrongly wired for Mains supply being used – i.e. mains voltage is too high. (e.g. a Valhalla wired for use with 115V mains being connected to 230V mains supply.)	Check that the Valhalla is correctly set for mains voltage being used. If wrong, adjust to correct mains setting by moving the 'Neutral' (blue) mains connection and move the fuse to the correct location.
Fuse blowing	Constant	Bridge rectifier BR1 faulty – gone short circuit internally.	Replace BR1 – Linn part no: MISS 032
Fuse blowing  Some components on the board (near the fuse holder) may be blown	Only affects older spec Valhallas.  This fault only occurs if a resistor is fitted at location R1 – on later Valhallas, this was replaced with a Surge Guard Varistor (a round black component)	Early Valhallas would occasionally blow if there was a surge in the mains, destroying BR1 (the Bridge rectifier), resistor R1 and the fuse.	Replace the 3 blown parts – available as a repair kit – Linn part no: VAL REPAIR. Note – the resistor is replaced with a Surge Guard to prevent re-occurrence.
Fuse blowing	Probably random & sporadic	Mains surges	Consult an electrician or your power company



## Switch on & LED Problems

**Important – Do not carry out any work on or near the Valhalla while it is powered up before reading the ‘Important Safety Information’ section above**

It is assumed at this point that you have checked that the Valhalla is definitely the cause of the fault – not a bad connection etc, the motor or anything on the LP12. If you have not, please do so before proceeding.

**Please note** – It is very important to differentiate between “powering up” and “switching on” the Valhalla. We define “powering up” as connecting the unit to the mains (this powers up the Valhalla). “Switching on”, on the other hand comprises of pressing the switch on the turntable to start the platter turning. In this section, we are referring only to the switching on. If the unit will not power up, this is dealt with in the ‘Power Up Problems’ section above.)

**If you are unsure whether or not the Valhalla is powered up:** If the turntable will not switch on, it can be difficult to know if the Valhalla is powered up or not. There is one simple, but rather crude & unscientific way to check: With the Valhalla fitted in the LP12, plug the Valhalla/LP12 into the mains and leave it connected for about 10 minutes; **unplug from the mains, leave for about 10-20 seconds** and then very carefully (they may be very hot) touch the resistors R2 & R3 on the Valhalla (the 2 large red resistors beside the terminal blocks). They should be hot. If they are not, the Valhalla is not powering up.

<u>Switching &amp; LED problems</u>			
Symptom	Circumstances	Possible Cause(s)	Cure
Will not switch on		Unit not powered up - See ‘Power up problems’ section above.	See ‘Power up problems’ section above.
Will not switch on	Unit powers up okay but won’t switch turntable	Bad connection to/from Valhalla or wires wrongly connected.	Check all connections between Valhalla, mains & LP12 – see the LP12 Circuitry Installation Procedure for instructions on correct fitting etc.
Will not switch on	Unit powers up okay but won’t switch turntable	Turntable switch faulty. Try another switch in the turntable if you have one, or if you can get access to another LP12 configured for Valhalla, try swapping the boards and/or switches to ascertain which is faulty.	Repair and/or replace switch – Linn part no: SWITCH (you would be forgiven for thinking that this is a typing error etc, but be assured this is the correct part number)
Will not switch on	Unit powers up okay but won’t switch turntable	IC4 (switching IC) faulty.	Replace IC4 – Linn part no: IC 021
Switch LED dies intermittently	Unit functions okay otherwise.	Leg of switch LED has a solder problem – probably dry solder joint, but perhaps a solder splash.	Solder fault should be visible – check & repair solder fault.
Switch LED dead	Constant  Unit functions okay otherwise	LED faulty.	Replace LED – Linn part no: MISS 052



## Turntable Motor Problems

**Important – Do not carry out any work on or near the Valhalla while it is powered up before reading the ‘Important Safety Information’ section above**

It is assumed at this point that you have checked that the Valhalla is definitely the cause of the fault – not a bad connection, a faulty motor or anything on the LP12. If you have not, please do so before proceeding – if you can get access to another LP12, try connecting the Valhalla to it to rule out the turntable motor etc.

<u>Turntable Motor Problems</u>			
Symptom	Circumstances	Possible Cause(s)	Cure
Turntable motor does not turn at all when turntable is switched on. Motor may buzz or vibrate.	Switch LED lights  Symptoms may vary.	R32 faulty – has gone open circuit (usual value = 560Kohm).	Replace R32 – Linn part no: RES 011
Turntable motor turns very weakly (may require a push to get started etc) or may turn only for a short time. May work for a while then stop & vibrate or buzz	Switch LED lights  Symptoms may vary.	R32 faulty – has gone open circuit (usual value = 560Kohm).	Replace R32 – Linn part no: RES 011
Turntable motor turns backwards May also have low torque	Switch LED lights  Symptoms may vary.	R32 faulty – has gone open circuit (usual value = 560Kohm).	Replace R32 – Linn part no: RES 011
Turntable motor buzzes (otherwise seems to work okay)	Switch LED lights  Probably constant Symptoms may vary	R32 faulty – has gone open circuit (usual value = 560Kohm).	Replace R32 – Linn part no: RES 011
Turntable motor does not turn at all when turntable is switched on Motor may buzz or vibrate.	Switch LED lights  May be intermittent and symptoms may vary.	One of the smoothing capacitors has gone faulty – C9, C10, C11, C12 & C13  It can be difficult to ascertain which capacitor is the cause without fault finding on the live circuit, so it is much easier just to replace all 5 capacitors	Replace faulty capacitor(s) – Linn part no: VAL 004 for all.

