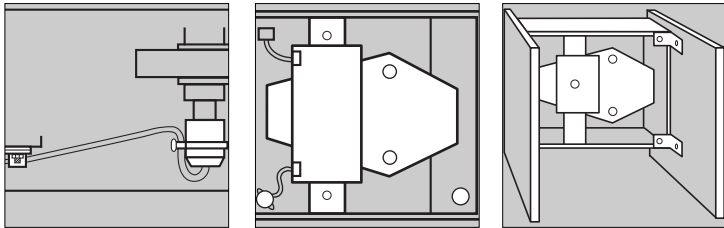


## Linn LP12

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### Servicing & setting up guide

Note: This is an independent publication NOT factory approved!



by  
**Russ Andrews**

# Linn LP12 servicing & setting up

The following is a detailed description of setting up the Linn LP12. It is a good model to follow for any suspended sub-chassis turntable like Ariston, Dunlop, Thorens, AR etc and so well worth reading, even for the non-LP12 owner.

## The Set-Up Jig

Build and fit the turntable set-up jig.

The set-up jig consists of:

2 pieces 12mm (1/2") chipboard or plywood 370mm x 370mm

4 x 1" brackets

4 x No. 8 (1/2") chipboard screws

### Unplug the LP12 from the mains (a.c.)

The jig is simple and a bit rough and ready, but it works and will make the job very much easier for you as it will support the turntable on its back, and standing up, while you work on it. (See back page for jig template.)

- Fit the brackets as shown on the diagram. The front of the jig is the edge with the bracket closest to it and will be fitted to the front of the turntable.

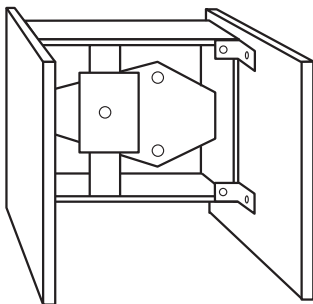


Diagram 1: View of the underside of the turntable

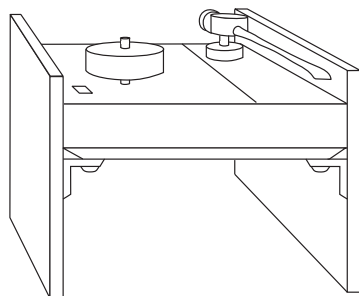


Diagram 2: View of the turntable in the jig.

The set-up jig is the key to the whole operation, making it easy, convenient and safe. You can do the job a step at a time and leave it safely at any stage. Organise a good surface to work on with plenty of space to lay things out.

- Remove the turntable cover, outer platter, inner platter and belt.
- Remove the bearing oil with a syringe or plug the hole to prevent spillage.
- Remove the tonearm counterweight and protect the cartridge stylus.
- Turn the turntable round so that its back is towards you and tip it up vertically so that you can remove the feet and hardboard base.
- Take the set-up jig side and stand it up against the left of the turntable (see diagram 3) so that the brackets go over the foot screw holes in the corners of the plinth.
- Refit the rubber feet through the holes on the brackets thereby fixing the jig to the plinth.
- Repeat this procedure on the other side.
- Now stand it upright and turn it round so that the front of the turntable faces you. It will wobble a bit but you can easily stabilise it by spreading the jig sides apart at the bottom.

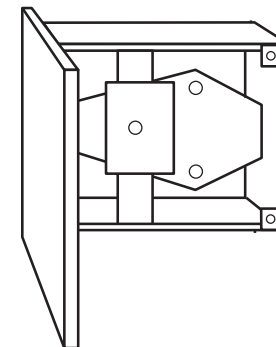


Diagram 3: Fitting the jig to the turntable

## Dismantling the LP12

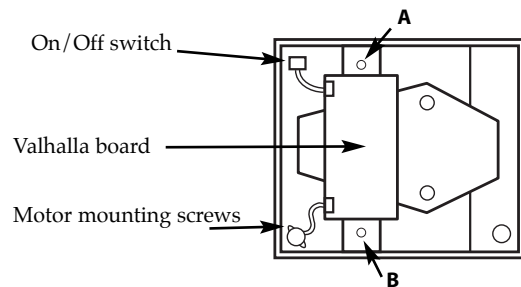
### Tools Required

- 1pt Posidrive screwdriver
- 2pt Posidrive screwdriver
- Box spanner size 2BA or M5
- Hex Allen key size 2mm A/F
- 6mm (1/4") flat blade screwdriver
- M4 drill bit

### Motor thrust bearing modification

- M4 nylon screw and nut

- Make sure the turntable is unplugged from the mains (a.c.)
- Using the box spanner, undo the nut locking the 'P' clip and remove the tonearm cable.
- Unplug the on-off switch cable from the socket J1 on the Valhalla board if it is fitted.
- Remove the cross member holding the motor drive (Valhalla or original) and lay it down still attached to the motor and with the mains lead still attached (there is no point in disconnecting all this unless you find it gets in your way).



A and B are the top plate mounting bolts.

**Diagram 4**

- Remove the arm board and tonearm.

**Now turn your attention to the sub-chassis and suspension springs.**

Note where each spring was used and try to put it back in that position on reassembly - it may help. If your turntable was good and the suspension bounced properly why tempt fate and move the springs about. They're supposed to be identical but... If, on the other hand, the 'bounce' was a mess, fitting new springs, or moving the old ones about will help solve the problem. Undo each nut and remove the springs and rubbers.

- Lift out the sub-chassis and notice that the bearing housing is held in by three set screws. These screws must be tightened with an Allen key, size 2mm A/F.

Revealed before you is the bottom of the top plate holding the switch motor, suspension mounting bolts and the bolts that clamp the top plate down to the plinth through the cross-member. Stop for a long cool gaze at the scene, the causes of many of the LP12 set-up difficulties lie here.

Observe the suspension spring bolts; their exact positional relationship to each other is critical, they must be straight and perpendicular to the top plate. You will understand that if anything is wrong here, the sub-chassis will not bounce freely and evenly up and down - there will be a bias or twist rotating the sub-chassis as it moves up and down. If you have doubts about any of these bolts, remove and straighten or replace them (note you could swap two of them for the top plate clamping bolts). Most Linn dealers keep dozens of these bolts for spares, and the smart ones check these bolts before bothering to fit an arm and cartridge as it can save so much time later. The holes in the top plate for these bolts are oversize so make sure that each bolt is in the centre of its hole when you tighten it up. A small drop of Loctite, Studlock or Nutlock will make sure they stay tight.

**Now observe the top plate from above.**

- The edge beside the arm board should dip slightly in the centre; if it doesn't, use the heel of your hand to push it down and put a slight dip into it.
- Turn it onto its back again and look at the other three sides of the top plate where they sit down on to the strips of wood. The plate should be in close contact all the way round when it is carrying the weight of the sub-chassis and platter. The Plate is often bent up slightly at

the corners so that it is free to vibrate and rattle against the plinth; it may seem a strange effect, but it affects the sound of the turntable.

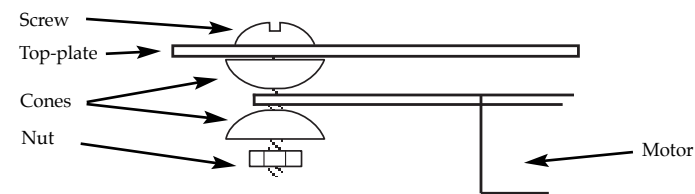
Overtightening of the top plate mounting bolts may have caused the corners to lift, as may careless fitting of the switch or motor. The only successful way to correct the problem is to remove the top plate and bend it slightly. (Go on, get it right - you only have to remove two little screws.)

**Turn your attention to the motor now**

- Check the condition of the mounting plate with the lugs for the fixing bolts.

It should be flat, but it may have been twisted and bent by over-tightening of the motor tilt screws. The motor tilt screws are adjusted from above and are used to set the height of the belt on the pulley.

- If the plate is bent, remove the motor and straighten it.
- Refit the motor as shown in the Diagram 5.
- Unscrew the motor tilt screws before tightening the motor fixing screws.
- Then screw the tilt screws down until they just touch the motor top plate - they will be adjusted later.
- Make sure that the motor fixing parts are assembled in the correct order, the cones are the correct way round and the bolts are done up tight.



**Diagram 5: Motor Mounting detail**

Notice also that the motor fixing screw holes in the top plate are long slots. This allows you to move the motor and reduce or increase the belt tension. The correct belt tension is the least that will drive the platter without slippage on the motor pulley. The half-way point in the slots (or one forward and one back) is usually OK but check it and adjust it when everything is assembled and running. Belt tension will, of course, affect the suspension - one reason for least tension.

**Reassembly**

Before going any further, I suggest you inspect the bearing housing (and the bearing of the inner Platter) for wear. The bearing wear will appear as a small circle on the very tip. This circle is presumably caused by micro welds due to the pressure of two and a half tons per square inch.

- You will have to empty out the oil to inspect the thrust pad in the bearing housing (only do

this if you have some spare Linn oil). Do not under any circumstances clean out the bearing housing with Meths or a degreasing solvent, as there is great danger of damaging the nylon bearing sleeves.

The wear on the thrust pad looks like an indentation. According to Linn, these bearings are guaranteed never to wear, so you have a strong case for a free of charge replacement if yours is worn.

- Clean the outside of the bearing housing with alcohol or a degreasing solvent.

A good earth for the bearing housing is important because it earths the platter and record, preventing static discharge through the cartridge. Check the nut and bolt securing the sub-chassis earth strap for tightness. Make sure it is refitted to the bottom cross member bolt before fitting the arm cable 'P' clip.

Some arm cables have a short length of wire coming from the 5 pin DIN arm plug, intended for arm/cable earthing to the turntable subchassis. This practice can be dangerous and is the cause of many hum problems. The danger arises when the earth to the turntable is removed to eliminate a hum loop. This may sound insane (and it is), but many Linn Dealers do it because Linn Products instruct the Dealer to fit the arm cable earth lead to their sub-chassis. Often there will be no apparent hum problem even if both the arm cable is earthed to the chassis and the chassis is earthed to the mains, but it is an 'unstable' earth condition that can be upset by simply changing the stylus or replacing the cable. Simply cut off this short arm earth wire. Leave the long earth wire (if fitted) to go to the preamp arm cable earth point.

- Now fit the sub-chassis back over the suspension bolts.
- Bring the earth wire out at the bottom as it will fit over the bottom top plate bolt.
- Find the suspension springs, take them apart and take the rubber parts. This eases adjustment and eliminates those irritating squeaking noises.
- Reassemble the parts and refit them to the sub-chassis as they were originally. Make sure that the top rubber fits into place in the sub-chassis properly; if the lip is kinked or distorted you will have difficulty getting the suspension to bounce right.
- Now fit the cross member and motor drive board (attached)
- Fit a big washer and a nut over each top-plate mounting bolt onto the cross member and do them up finger tight.
- Using the box spanner without a tommy bar, do up each nut hand tight only, then fit a tommy bar and tighten by one 1/4 turn. That is as tight as it needs to be. Any further tightening only crushes the washer, the cross member, the wood-block and bends the top plate. This is one of those things you must get right so do not be afraid to do it a couple of times to get the feel of it and be confident that it is right. Over a period of time the washer and cross member collapse slightly and so the nut will be loose, so re-tighten at least every 12 months. If the nuts are slack the sound of the turntable will be very flat, lifeless and sloppy - seeming to lack well-defined bass. Overtightening the nuts produces a strained, choppy, resonant sound.

## Fitting the armboard

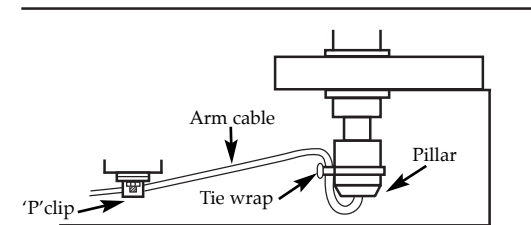
Check the mounting of your arm to the armboard. Do up the mounting screws or bolts good and tight. Turn the turntable upright and fit the armboard with three small screws supplied. These are special screws and are the best way to fix into the Linn armboard. Nuts and bolts simply crush the wood and go slack. Do not tighten the screws down fully at this stage; the armboard may need squaring up in the plinth later. Recharge the bearing housing with the correct amount of Linn oil. Fit the inner platter, belt and the outer platter. Now you can adjust the suspension with the height setting nuts to achieve a first rough setting up.

The top surface of the armboard should be just 1mm above the level of the plinth. Roughly level the armboard (but be gentle with it!).

Remove the outer platter, turn the beast on its back again and fit the arm cable. Assemble the washer and the 'P' clip with the cable through the 'P' clip. Fit a small washer under the lock nut to prevent it from damaging the 'P' clip. The clip is adjusted by doing up the lock nut until the jaws just touch and then slipping a screwdriver into the slot in the long jaw and levering up against the large washer behind it. When the clip is tight on the cable, do up the nut tightly.

Arm cable tension is important, of course, because it can bias the suspension. The tension should be neutral. This is very difficult to achieve if the cable is stiff and comes straight from the bottom of the arm pillar. The job can be made a lot easier, however, if you bend the cable back up to the pillar and secure it tightly with a tie wrap. Then the arm cable will curve down to the 'P' clip (missing all obstacles in between) and allow easy lateral movement of the suspension (see Diagram 6).

Some small adjustment of the arm cable tension can be made by slightly loosening the 'P' clip and twisting it to give more or less slack.



**Diagram 6:** Arm Cable fitting

Remember, do not attempt to earth the arm cable or tone arm to the turntable earth, it should go only to the preamp. If you ground to the turntable, low frequency earth eddy currents in the turntable will flow through the arm and cartridge into the disc preamp increasing hum and degrading bass performance. Though mechanically part of the turntable the arm and cartridge are electrically an extension of the preamp.

## Setting up

Right, let us tackle the difficult bit, the jobs only highly skilled Linn Dealers can do after years of training at the factory!

The mysteries of the LP12 are about to be revealed to you - observe and understand. If you understand what is happening and you know what you are trying to achieve, nothing stands between you and success.

Stand the turntable the right way up and level the plinth first before trying to level the suspension. Level the plinth by putting solid packing under the corners of the set-up jig. Spread the jig legs apart first to get maximum stability - a wobbly jig will ruin the suspension bounce.

Now level the suspension. A spirit level may be quite misleading here so rely on your eye and use the armboard as your guide. Adjust the suspension until the armboard sits just above the level of the plinth as before. This gives a good sight line from front to back and for side to side levelling.

- Make sure that the armboard is screwed down flat to the subchassis, but don't overtighten those dinky little screws! It is your only guide to whether the subchassis is level. Now check that the platter is level to the plinth and the armboard. Don't panic if it isn't perfect, but it should be close. If you have made absolutely sure that the armboard is properly flat to the subchassis and there is still a big discrepancy between them, then the bearing housing is not square in the subchassis.
- Correction can be achieved by very carefully bending the bearing housing in the subchassis. Secret: Linn make a special tool for this! You can make one yourself using a short piece (10") of steel conduit pipe. Place it over the top of the bearing housing and very, very carefully straighten the housing in the subchassis. As I said though don't waste too much effort on this because there may be bigger discrepancies in the tone-arm and the whole thing can be corrected by adjusting the azimuth of the cartridge at the headshell.

### **Find the centre of gravity of the suspension and bounce - or do I mean bounce the suspension and find the centre of gravity?**

You will notice immediately that to get the whole suspension bouncing straight up and down you must apply force somewhere between the centre spindle and the tonearm pivots. This is one of the design weaknesses that makes the LP12 so variable and difficult to set up. There is unequal compression on the springs - as you can see from the position of the adjustment nuts after levelling. The spring near the arm is well compressed, but the one furthest away is well extended and the nut hardly on more than a few turns. For the whole suspension to bounce straight up and down - which it must - each spring must move freely straight up and down.

It will only do this if the mounting bolt is sitting centrally through the spring and mounting rubber. If it isn't there will be a bias that pulls the spring to one side, and this will cause the whole suspension to twist laterally as it bounces up and down.

The straight, free bounce we are trying so hard to achieve is important because it sets the whole low frequency performance of the turntable. Good bounce means good bass.

We are looking for an even, free, straight up and down bounce that dies quickly and smoothly in 3 or 4 seconds. If yours does this, move straight to 'Go' and collect £200. Smile and celebrate your good fortune.

### **If it doesn't work**

If not, let's have a look at what is happening. Time spent bouncing the suspension and watching the way it moves and also looking at the way the springs move is very well spent. Here is where good observation pays dividends. If you watch carefully you will be able to detect which springs are moving (or trying to move) straight and which are twisting. Look up at each spring from underneath and see if the bolt is central. A torch will be useful. If the bolt is off centre, hold the nut with one hand and twist the spring round with the other. The very observant will have noticed that the hole in the subchassis is bigger than the mounting rubber. This is to allow you to centralise the mounting bolt in the spring. The twisting simply moves the rubber in the hole. Keep checking that the suspension is still level because it is very easy to move the height adjustment nut when you twist the springs. The whole process should be quite easy because we have taken steps to eliminate most of the variables as we went along. Just make sure that the arm cable isn't causing a problem and check the tension of the belt.

If you are still having trouble it might be worth changing the springs round. They should all be identical, but often they aren't. To check them, line them up on a flat surface and see if they are all the same height. If they aren't all the same and switching them round doesn't help, then start again with a new set of springs. Don't worry, Linn Dealers spend a lot of time changing springs.

If you have isolated the problem to one spring, and twisting will not give enough adjustment, remember that the bolt can be moved slightly. This can be done without removing the whole subchassis, just take off the spring and rubber and use the box spanner and 2pt Posidrive.

### **At last, it all bounces beautifully - easy wasn't it?**

## All is now ready for testing

Remember that the mains bites if you touch it and the Valhalla board bites worse. Unplug from the mains before putting your hand underneath to make any adjustments, as there are large irritable volts all over it and you cannot touch it anywhere without getting bitten!

- Plug in the Valhalla On/Off switch.
- Have a look at the belt and the pulley. There may be rubber deposited on the pulley - clean it off with meths and talc the belt - only a little talc is necessary - dust off excess.

- Refit the belt, turn the platter over on the inner so that you can see the belt in the guide and on the pulley and start the turntable up.
- Let it run for half an hour to settle.

If the belt runs up against the top of the guide, adjust the motor tilt screws to make it run in the centre. Screw both screws down to just touch the motor top plate. Tilt the motor by tightening one and slackening the other. Try not to bend the motor plate. The correct position for the belt when running is with most of the belt on the flat part of the pulley.

Remember that the speed of the platter can be changed slightly by altering the angle of the pulley by tilting the motor with the two adjustment screws. Slacken one before tightening the other to avoid bending the motor top plate. Use a strobe disc and Zapper strobe light (see our Turntable Guide) to set the speed exactly right.

If the belt is running mostly on the tapered part of the pulley then its diameter is effectively smaller and the speed of the platter will fall below  $33 \frac{1}{3}$  RPM.

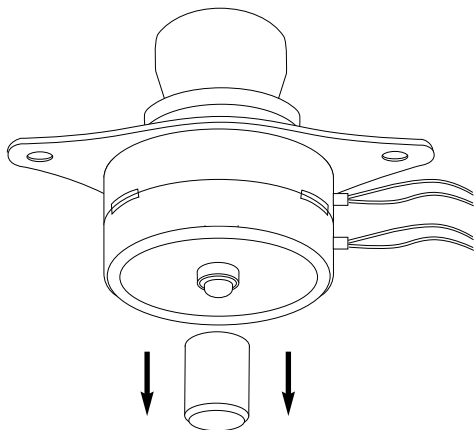
Let the newly talced belt run in before wasting time setting the speed exactly. The whole suspension will settle slightly and need readjusting.

### Motor thrust bearing modification

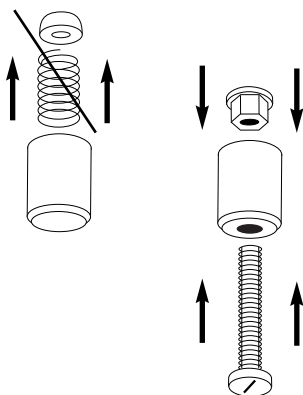
You can now proceed with the last modification, the replacement of the spring thrust bearing on the bottom of the motor (pre -LINGO turntable only).

Unplug the turntable!

Remove the nylon cup and remove the spring. Leave the nylon thrust pad in place on the motor rotor. Clean out the cup with meths to remove any oil or grease.



**Diagram 7:** Remove the nylon cup



**Diagram 8:** Remove the spring and screw in the nylon nut & bolt

Using the M4 drill, drill a hole in the bottom of the cup (in the centre!).

Take the nylon nut and drop it into the cup with the washer face up. It will sit on a

convenient ledge near the bottom of the cup. A few drops of superglue will secure it in place. Put the nylon screw in from the bottom. Leave it just showing through the nut. Fit the cup back on to the bottom of the motor and seal it on with a little nail varnish (where you get this is your business!)

When dry adjust up the nylon bolt until it just touches the motor rotor thrust pad.

Now for the crucial adjustment. With one hand lift the motor pulley and feel the end float between the top bearing and the bottom thrust pad. With the other hand screw in the nylon bolt to just take out the end float. Adjust it in and out a few times to get the feel of it because you should just take out the end float and no more.

Plug the turntable in again and let it run to bed it in.

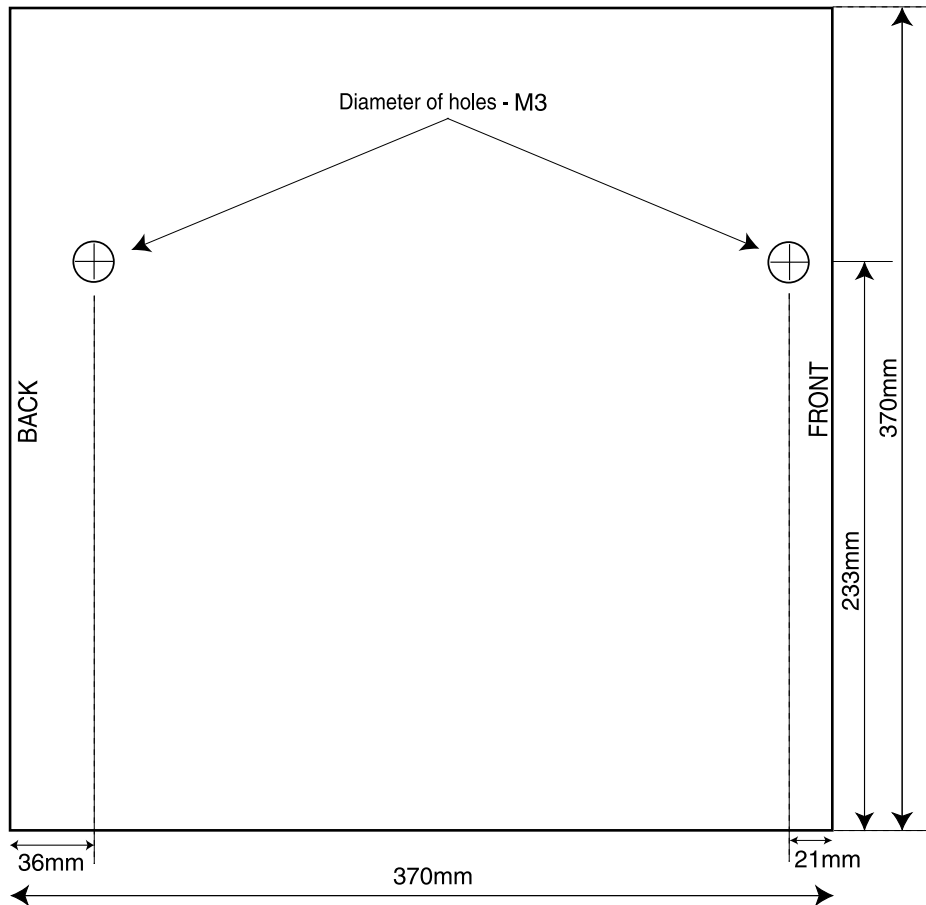
The motor noise will be higher at first, but should then go quiet in about 30 minutes. Check the end float again (switch off the mains first!) after it has run in.

Make sure there is enough oil in the main bearing. Too little makes a clearly audible difference, so if you have lost oil accidentally or removed it to inspect the bearing, take the trouble to get some more from a Linn Dealer.

Fit the cartridge and adjust the tone-arm. Check the tone-arm mounting screws or bolts for tightness.

Unplug from the mains and remove the set-up jig.

That's it, the rest is up to you - enjoy the fruits of your labour.



**Diagram 9** : Side view of Linn Turntable set-up jig. Diagram is to scale.

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