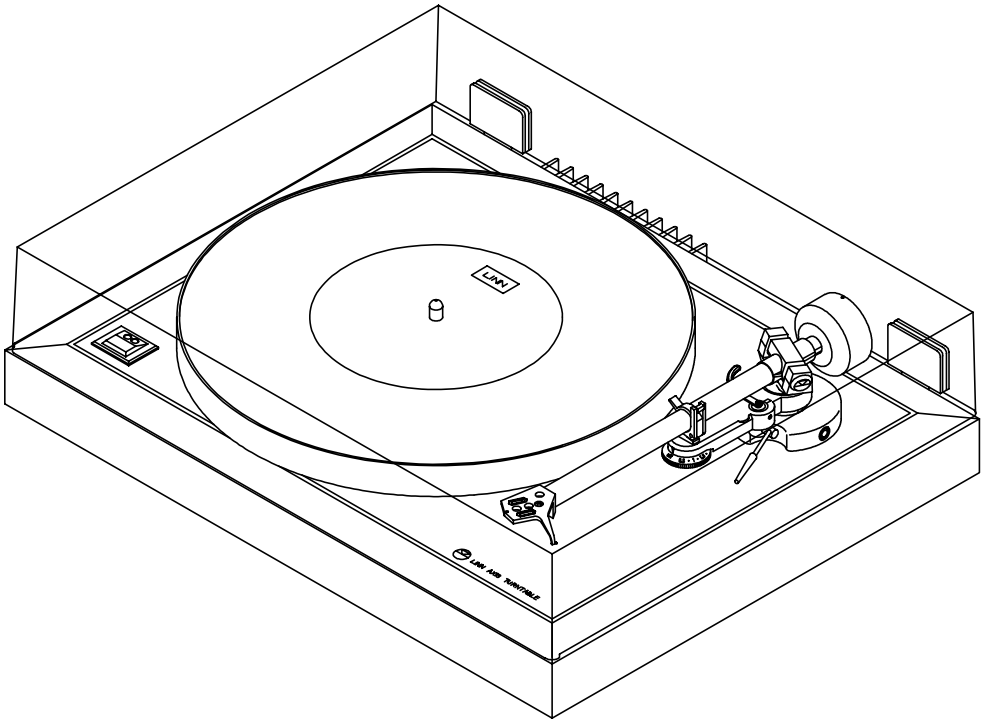
AXIS TURNTABLE



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AXIS TURNTABLE

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AXIS

The LP12, of course, was a tough act to follow. However, without compromising the high quality and precision engineering standards set by the LP12, Linn introduced the more affordable AXIS turntable in 1986.

The single point bearing, a version of Sondek's patented bearing, and the platter are key components in the Axis turntable, leading to very high rotational accuracy with minimum friction and resulting in less noise - more music.

One special feature in the Axis is the special load-sensing circuitry applied to the 24-pole synchronous motor. This feeds the motor with a higher voltage for increased start-up torque, and when the platter reaches the selected speed, 33.3 rpm or 45 rpm, the load-sensing circuitry reduces the power output. The motor then maintains the platter's own inertia to keep it going, silently.

The Axis requires much simpler set-up than the LP12. Set-up instructions are described in the following pages along with recommended tools you will need. A quick Fault Finding Table will help you identify and correct minor faults. The section on Guidelines for Repair & Upgrade gives instructions on how to change the tonearm, plinth, top-board and motorboard; how to modify powered up in the stopped position. Product specifications are listed at the end of this section.

The Axis was discontinued in March 1994.

AXIS SET-UP INSTRUCTIONS

Estimated Time of Completion for this task ~ 30 minutes

1. Unpack turntable, checking that all parts are present.

2. Remove transit screw from base and un-clip arm cable.

3. Remove rubber cap from bearing housing and fill with oil charge supplied. Place a cloth or tissue around bearing housing to catch any overspill of oil.

4. Fit inner platter into bearing housing. Remove inner platter once it has settled. Remove cloth or tissue and re-fit inner platter. This procedure will ensure no excess oil on the top-board.

5. Fit belt - make sure it is running in the centre of the pulley as this will result in the deck running fast.

6. Fit outer platter and felt mat.

7. Fit chosen cartridge to arm and align it using a Linn protractor (ensure cartridge is fully tightened once aligned). Fit arm into collar and finger-tighten arm height locking screw.

8. Plug arm lead into arm - check that flying earth has been removed.

9. Set arm parallel to a record surface with tracking weight and bias correctly applied. Tighten arm height locking screw.
   NB: It is very important that you do not over-tighten the height locking screw. The Akito Pillar and not as strong as the pillars used in the Ittok and Ekos tonearms.

   To tighten correctly:
   a. take up slack, inserting allen key lengthwise into screw.
   b. check arm is at correct height.
   c. insert allen key with short end into screw and tighten a further 1/8 turn. No more ... if you overtighten the screw you could damage the bearings.

10. Check that top-board is sitting squarely in plinth. If not, loosen suspension adjusting screws as far as possible and twist board until square. Then re-adjust suspension (ensure that the motor is not fouling the top-board).

11. With deck on a level, flat surface (not a set-up jig, as without support the suspension will drop slightly), check that top-board is level with plinth. If not, adjust as required. Do not adjust the top-board so low that it fouls the plinth.

12. Again, with deck on a flat surface, check that the portion of arm cable between cable camp and where the cable plugs in, does not touch plinth or surface on which deck stands. If it fouls, loosen clamp screws and adjust cable as necessary.

13. Apply mains and check that anti-stall circuitry works at 33 and 45 rpm. Do this by momentarily touching moving platter. Motor noise will increase slightly and the relevant LED will glow more brightly for about eight seconds. After this time, if the LED continues to glow more brightly, or dims and brightens successively, there is a fault. See Axis Fault Finding.

    Note: When starting at 45 rpm the anti-stall circuitry will operate twice i.e., red to bright green, to dim green, to bright green to dim green.

14. The deck is now ready to play.

Service Tips

If you have to remove the top-board for any reason, the easiest way of aligning the suspension screws with the bighead nuts is to put the deck upside-down on your knees. While doing the work on the suspension screws ensure that no oil is present in the bearing housing and that the inner and outer platters, belt and arm have been removed.

Also, when re-fitting the top-board ensure that the long earth lead is looped round the earth tag to avoid the wire fouling or shorting against anything.

Do not be tempted to over-tighten the bearing housing nut; it is factory set to a specific torque and over-tightening will distort the alignment of the platter. Likewise, do not over-tighten the arm collar screws, as over-tightening will crack the lower laminate.

To remove the arm cable, gently lever the plug off with a suitable flat-bladed screwdriver.

Important
The motor and board assembly cannot be properly tested out of the turntable or without the belt, inner and outer platters attached, as the electronics depend on the inertia of the platters to work correctly, i.e.. the motor will stall, without load applied.

When mains is applied, the deck may come on at 33 or 45 rpm - this is perfectly normal. However, if this causes concern to customers it can be modified to power up 'stopped' - see page 3.14.

RECOMMENDED TOOLS FOR AXIS SET-UP

No. 2 pozidrive screwdriver
No. 3 pozidrive screwdriver
4 mm Hex t-bar driver
1/8" flat bladed screwdriver
1/4" flat bladed screwdriver
4 mm A/F Hexagon Key
2 mm A/F Hexagon Key
5 mm A/F crescent spanner
Weller 100 W soldering iron
Solder
Linn Speedchecker
Exploded Drawing

AXIS FAULT FINDING

Symptom	Fault	Solution
LED dead	Fuse blown	Check fuse in the mains plug (if fitted) and internal fuse on the motor board. Be sure to replace with correct value - 400 ma anti-surge for the internal fuse. Check motor board visually for blown components, especially R1 if fitted. If any components are blown replace board.
Platter does not turn, but LED lights up or dims and brightens; or platter does not reach correct speed	Belt fallen off	Re-fit belt, replace if stretched.
	Motor spindle stuck, or does not turn freely	Two likely causes: the bottom bearing of the motor has been pushed out of its seating; this is easily fixed by removing the whole motor pcb assembly from the plinth and pushing the bearing with a biro (remove refill first) until it clicks back into place; or black gunge fouling the bearing. Flush out bearing and re-oil. See procedure page 2.51.

Symptom	Fault	Solution
Platter does not turn but LED lights up or dims and brightens; or platter does not reach correct speed (Cont'd)	Mechanical restrictions to the platters, e.g.. outer platter fouling on the plinth, or inner platter not free to turn.	Clear any obstruction found, adjust height if top-board is too low.
Speed too slow/ fast	Speed incorrectly adjusted.	Adjust speed. Make sure belt and pulley are clean before adjusting speed. Connect Axis to mains and allow to warm up for 10 - 15 minutes before adjusting speed.
Speed will not adjust	Motor faulty/ bearings tight	See previous page.
	Motor board electronics faulty	Replace board with latest spec. PCAS 011/B with switch on plinth PCAS 011/NB with switch on top-board.
	Inner platter has been pushed into bearing with protective sheath fitted.	Drain oil, clean out bearing and top up bearing with new oil.

Symptom	Fault	Solution
Platter wobbles	Matching surfaces are dirty	Anything preventing the platters from matching properly can cause the outer platter to sit off square. Clean matching surface on both platters with lighter fuel or IPA.
dropped	Warped outer platter	Try the deck with another platter to check fault. If platter has been it will be distorted. Replace platter.
	Inner platter is off balance	Confirm fault by trying another inner platter. If faulty, replace patter.
Top-board not level/too low	Incorrect suspension setting	Re-set height/level of top-board screws as required.

AXIS GUIDELINES FOR UPGRADE AND REPAIR

CHANGING THE TONEARM

Estimated Time of Completion for this task ~ 15 minutes

Tools Required:
4 mm Allen Key
Flatbladed screwdriver
Record Alignment protractor

Instructions:

1. Remove outer platter, belt and inner platter.

2. Place bearing cover over bearing housing to stop oil escaping.

Removal

3. Hold Axis on its left side and remove arm cable from base of arm. If required, gently lever with flat blade screwdriver.

4. Lay Axis face up and, using allen key, slacken arm height locking screw.

5. Lift arm out of collar.

Re-fitting

6. Place arm in collar; if necessary slacken arm height locking screw.

7. Holding arm at approximate height, lightly tighten screw. Re-fit inner platter, belt, outer platter and felt mat.

8. Check arm height. Arm tube should be parallel to record. Adjust as required.

9. Lock arm in position. Note: Be careful not to over-tighten the screw. This is best avoided by tightening screw with long side of allen key inserted into the height locking screw until tight. Then reverse alley key (short end into screw) and tighten a further 1/8 turn only.

10. Have a listen.

CHANGING THE PLINTH, TOP-BOARD (TO STEP 7) AND MOTORBOARD (TO STEP 8)

Tools required:
No. 2 pozidrive screwdriver
No. 3 pozidrive screwdriver
3 mm flat blade screwdriver
4 mm allen key
Solder Soldering Iron (Weller PU2D station)

Estimated Time of Completion for this task ~ 30 minutes

Instructions:

1. Remove lid if fitted. Remove outer platter, belt and inner platter.

2. Place bearing cover over bearing housing to stop oil escaping.

3. Secure tonearm in arm-rest with arm-clip and fit stylus guard to cartridge (or remove stylus and keep in a safe place).

4. Unplug arm-cable; hold Axis on its left side and remove arm cable from base of arm. If tight it can be gently levered with a flat blade screwdriver.

5. Place in jig if available.

6. Remove three large feet screws located in the centre of the feet on underside of turntable.

7. Lift top-board off carefully to avoid damage to motor pulley - place to one side.

8. Disconnect top-board by de-soldering earth wire from large tag under bearing housing. Be sure to cover the motor pcb to protect it from solder splashes. If switch is fitted to top-board unplug from motor board. Place to one side to keep safe (not on the floor!)

9. Remove live and neutral wires from board connector and the five screws securing the board to the plinth. Lift board forward and unplug switch if fitted to plinth. Early versions had the switch soldered to the board direct; in such cases remove the whole switch assembly. Switch screw is located under the switch wires.

10. Remove feet, hinge backplates, arm-cable and serial number badge from plinth.

Re-fitting:

11. Carry out steps 10 to 1 - reversing procedure.

Check Speed:

12. Remember to run unit for 10 minutes to allow electronics to warm up and stabilise before checking or adjusting speed.

13. Audition.

REPLACING EARLY AXIS BOARD WITH REVISED BOARD

Estimated Time of Completion for this task ~ 30 minutes

In November 1986 we changed the earth circuitry of the Axis motor control boards to satisfy certain countries safety standards.

Instead of routing the earth on the board itself, later boards use the heatsink as the main connection. If you require to replace an early board, please use the following instructions to ensure continued safety:

Components Supplied:
1 Axis motor control board including switch and motor
1 Switch spacer (wooden block)
1 Bezel
1 Switch screw
1 IEC mains connector with leads fitted.

Tools Required:
No. 2 pozidrive screwdriver
No. 3 pozidrive screwdriver
4 mm hexagon key
3 mm flat blade screwdriver
Soldering Iron (Weller PU2D station)
Solder
Bearing cap
Methylated spirit

Instructions:

1. Disconnect turntable from mains supply.

2. Remove the two mains connector securing screws.

3. Remove outer platter, belt, inner platter and tonearm.

4. Fit bearing cap: put deck upside down on your knee, remove suspension screws and washers. Turn deck correct way up and put on work surface, being careful not to drop or damage the top-board. Lift top-board clear and de-solder the earth wire from the tap underneath the bearing housing. Put top-board in a safe place.

5. Remove earth, neutral and live wires from the board connector. Remove the five screws securing the board to the plinth. Lift board forward onto left suspension unit. Remove switch assembly securing screw and spacer.

6. Remove board/switch, label with fault, date and serial number.

7. Remove the screw holding cable tie and supply wires. Remove complete mains connector assembly.

8. Put new mains connector assembly in position; screw it to the plinth and screw cable tie and supply wires in place.

Note: Observe static-safe precautions when handling the board. If you have no conductive mat, place the board on the black bag. While touching the bag, ground yourself to some earthed object. Always handle circuit boards by the edges only.

9. Place new board in deck forward of its normal position to allow easy fitting of switch.

10. Switch on plinth
Remove old bezel, fit centrally in plinth cutout using spacer (wooden block) and screw provided. Clean area on which bezel is to be located with methylated spirit, allow to dry. Peel backing from bezel and position so that the switch operates without fouling the bezel.

    Switch on Top board
    Locate switch in cut-out. Ensure switch ribbon does not foul top board.

11. Put board in position, screw in the five securing screws, connect live and neutral wires and tighten the other two screws in the terminal block - DO NOT CONNECT ANY EARTH HERE.

    Connect the main earth to the heatsink via the solder tag using a No. 6 x 1.2" screw and shakeproof washer.

12. Ensure that the earth wires/solder tags at either end of the heatsink and around the motor are bent down sufficiently to clear the top board (the earth wire going to the motor should be

as close to the motor casing as possible).

13. Wrap, then solder the long earth lead onto the tap on the bearing housing. Fold the earth behind the tag and re-fit the top-board.

14. Re-fit top-board (on your knee is easiest), inner platter, belt, outer platter and tonearm. Level suspension and check func tions (see Axis Set-up Instructions page 3.3) .

HOW TO MODIFY POWERED UP IN STOPPED POSITION

Estimated Time of Completion for this task ~ 30 minutes

Parts Required:
2u2 (16 V) Tantalium capacitor
470 Kohm 1/4 watt resistor
3 cm of insulated wire

Tools Required:
No. 2 pozidrive screwdriver
No. 3 pozidrive screwdriver
4 mm hexagon allen key
Soldering Iron (Weller PU2D station)
Solder Fine side cutters
sharp knife

Instructions:

Observe 'Static-Safe' Precautions
If you do not have a conductive mat, place the board on an anti-static black bag. While touching the board, ground yourself to some earthed object. Always handle the board by the edges only.

1. Remove the pcb from the Axis.

2. Cut track from U1 (10) to U2 (6 and 7). See drawing for location. Use a sharp knife or scalpel - be careful not to damage the legs of the ICs.

3. Cut track on reverse side, from U1 (10) to U1 (8 & 7).

4. Add a wire jumper from leg 7 of U1 to leg 7 of U2. Use insulated covered wire, ensure there are no shorts.

5. Solder new components in place: 2u2 (greater than 16 V) from U1 (leg 14) to U1 (leg 10) 470 k resistor from U1 (10) to U2 (7)

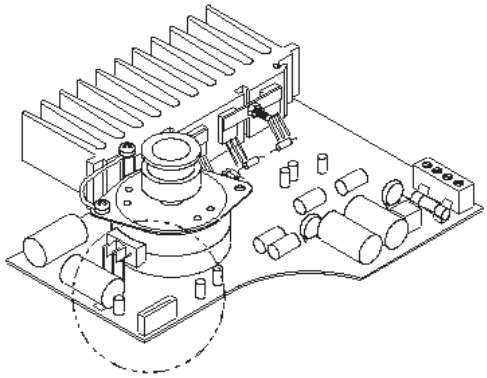
6. Check solder joints. Check for shorts.

7. Re-assemble Axis.

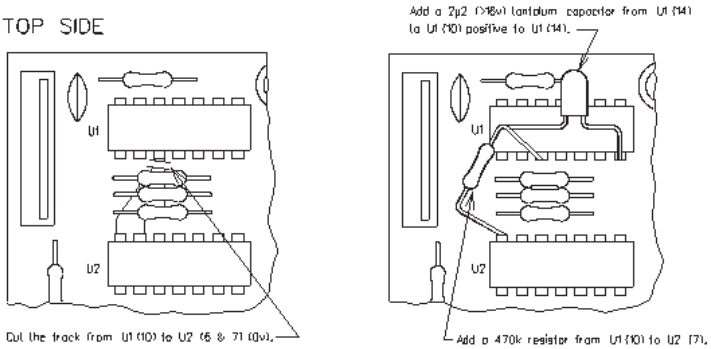
8. Check speed.

9. Audition.

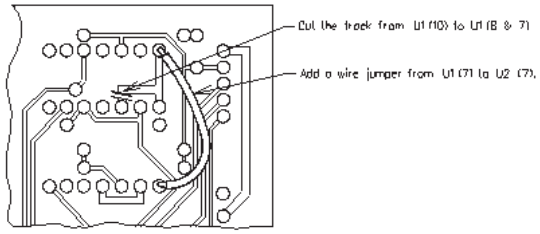
HOW TO MODIFY AN AXIS BOARD TO POWER UP STOPPED



TOP SIDE



SOLDER SIDE



AXIS HISTORY AND UPGRADE PATH

Discontinued in March 1994

We have made several significant production and reliability improvements to the Axis since its introduction in 1985. Details of these changes are set out below, including date and serial number of change.

The best upgrade for the customer, of course, is to introduce him to the LP12.

Upgrade	Year	Serial Number
Akito		
Replaced Basik plus with Akito as standard tonearm.	May '89 (UK) Jun. '89 (EX)	22,612 22,906
Plinth		
Changed from high density chipboard to a medite plinth, grooved and glued.	Apr. '89	22,022
Motor Board PCAS 011/NB		
Switch moved from the plinth to the top-board.		
Connecting wires were changed from solder connection to flexible PCB connector which plugs into socket on motor board.	Apr. '89	22,022
Two varistors fitted to protect from mains voltage spikes. R1 replaced by a shorting link. Uprated fuse from 200 ma to 400 ma.	Apr. '88	15,000
Top-board		
Transit screw 't' nut removed. It now threads into top-board.	Oct. '88	18,093
Changed to laminate on both surfaces. Eliminates warping.	Apr. '89	22,022
Motor Board PCAS 011		
Earth wiring changed. Mains earth now goes to heatsink and not onto pcb connector.	Nov. '86	2,600

AXIS SPECIFICATIONS

The AXIS is a precision built, twin speed (33.3 rpm and 45 rpm) transcription turntable. It is mounted in a black veneered medite plinth, with a dark grey top-board and equipped with a moulded, hinged dustcover.

Platter
12" diameter (305 mm) aluminium diecast and accurately machined on all matching and visible surfaces. Weight approx. 1.5 kg. The platter is supplied with a felt mat.

Bearing
Single point system running in an oil bath. The thrust pad which must support the weight of the platter on a single point is top grade steel, machined, hardened, ground and lapped to a mirror finish.

Motor
24-pole precision synchronous low noise, high torque motor. Fully shielded and mechanically isolated from the main bearing assembly by resilient mounting and a damped, uniquely designed suspension system.

Speeds
33.3 rpm and 45 rpm. Speed accuracy = 0.1%

Motor Power Supply
Linn-designed 2-speed electronic 'Class A' power supply incorporating a stall detect circuit.

This monitors the load on the motor from start-up and reduced the power supply to the motor once the correct speed has been achieved. It will also increase the power to the motor as required. When this happens the relevant LED on the switch will brighten to show increased power, and dim once power is reduced. Easily changed (internally) from 110 V to 240 V and will run on 50 Hz or 60 Hz without modification.

Suspension
Three silicone, custom moulded rubber mounts, providing isolation for both the turntable/arm platform from the motor/plinth, and the feet from the plinth. Easily adjusted to keep record platform level.

Drive
Flat, precision ground neoprene rubber belt driven by a concentric drive pulley; concentricity 0.0004" (0.01 mm).

Top-plate
Heavy medite wood, laminated on both sides.

Power Consumption
8 Watts

Dimensions

Width	445 mm
Depth	349 mm
Height	140 mm

With lid open 15 3/4" (400 mm) high

Shipping weight 17.6 lbs (8 kg)