



# LINN

## **LK2(60) & LK275 Reliability Modifications**

Some components on the PCAS 003 (used in the LK260 & LK275) are sometimes prone to failure after many years of use.

This modification can be carried out as a preventative measure to prolong the life of the amplifier or as a combined repair / prevention if one of the components has failed.

Carrying out this modification will repair around 60 – 70% of LK2 faults

### Important Information about this modification

- Please read through this procedure in its entirety before starting any work.
- It is important to follow ALL instructions carefully and exactly
- This procedure involves soldering and de-soldering and it is advised that only personnel with a fairly high degree of soldering skill undertake this task. Due to the age and the years of heat stress – some of the solder joints may have changed their chemical properties and if this is the case it will be quite difficult to melt them. Use flux (or melt new solder onto the old solder joint), Use heat and patience - not force.
- The changes outlined in this procedure will protect the LK2 from similar potential failures in the future by using higher wattage resistors than were originally used and adjusting the position of some components to minimise heat damage
- It is advised that all these modifications are carried out to both channels.

### Estimated time for completion of this task:

1 hour

### CAUTION – Important Safety Information

- **Residual Voltage.** With certain faults especially but also under normal circumstances, there can be residual voltage stored in the boards which could cause quite a serious electric shock. To avoid this, it is best to leave the LK2 switched off for a few hours before starting work on it and then using a voltmeter, measure across the metal contacts of each of the big capacitors (DO NOT TOUCH) on each channel (DC voltage). If there is a voltage remaining on these capacitors then it is important to discharge it – either short across the + & - contacts with a screwdriver – this can cause a harmless but spectacular and terrifying bang combined with a huge spark. It is much more pleasant to connect one of the resistors that you will use for the mod – the 2.4Kohm/2.5Watt and connect this across the contacts of the capacitors until the voltage has discharged.
- **The LK2 is very heavy and has sharp fins** on the heatsink – be very careful when lifting, handling, dismantling and re-assembling not to injure yourself.



## Fault Symptoms

There are several different symptoms, depending on what component has failed (symptoms usually affect one channel only):

- No output at all
- Bad distortion at output
- DC at output

## Units affected

Potentially all LK260s or LK275s (those not upgraded to LK280)

## Equipment Required

*(Those items marked ~ may not definitely be required)*

Workbench clear of debris and clutter

No2 Posidriv (Supadriv) Screwdriver

~ No1 Posidriv (Supadriv) Screwdriver

~ 2.5mm Hex key or Allen Key

~ Medium sized flat-blade screwdriver

7mm spanner or nut-runner

5.5mm spanner or nut-runner

Soldering Iron, temperature controlled 25 watt with fine tip

Solder Sucker

Fine solder

Paper handkerchiefs or paper towels

Heatsink compound (a white grease-like substance that improves heat conduction)

Fine Pliers

Soft cloth

## Parts Required

20Kohm, 2.5Watt resistor Qty 2 (per unit)

2.4Kohm, 2.5Watt resistor Qty 2 (per unit)

220pF 160V Polystyrene capacitor Qty 2 (per unit)

68pF 160V Polystyrene capacitor Qty 2 (per unit)

Note – if you cannot find the above parts available in your local area, some alternatives are available in the case of the resistor wattage values:

It is possible to use a higher wattage resistor in each case, although it tends to be the case that the higher the wattage, the larger the resistor and it may not be able to physically fit in the space available or may touch against another device or component, especially in the case of R33 (not a good idea).

It is possible to use a slightly lower wattage resistor in each case, however if too low. this will shorten the life of the resistor and the fault may re-occur. A minimum of 1 watt is recommended.

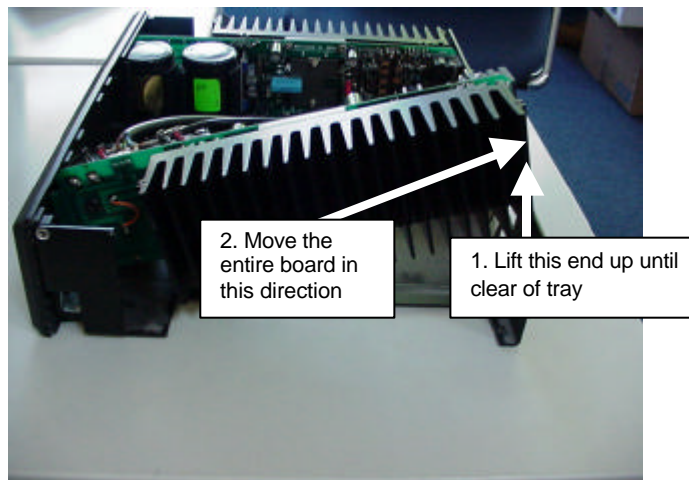


## Procedure

### **Step 1. Remove the boards from the LK2**

*Remember to keep all the screws and other parts that you remove from the LK2 in a safe place.*

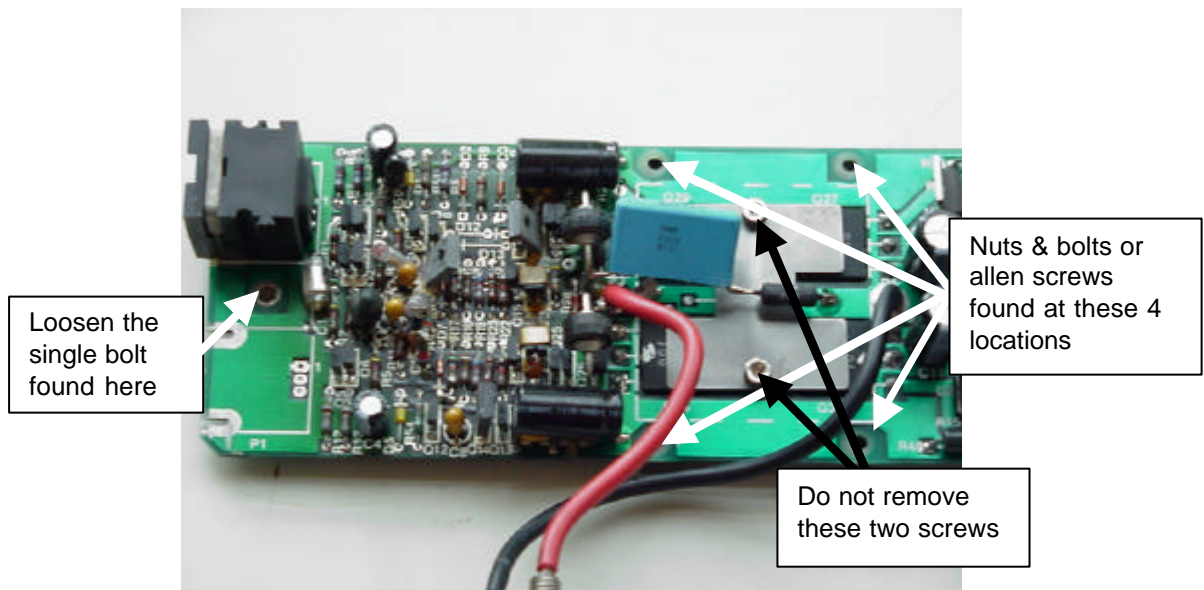
1. Disconnect LK2 from everything and especially the mains (or Spark).
2. Place a soft cloth on the workbench & lie the LK2 upside down on the cloth. Using a No2 posidriv screwdriver, remove the 4 screws that hold the sleeve on to the LK2. Stand the LK2 on its fascia and slide the sleeve up and off and carefully set it aside in a safe place where it will not get scratched or damaged.
3. Remove the 4 allen bolts or screws (older units used screws) holding the speaker sockets on to the back panel. Do this to both channels.
4. Disconnect both transformer connectors (the cables going from transformer to board) from the board
5. Lift the LK2 up so that it is standing on one of the heatsinks. Each channel is held into the tray by 2 countersunk screws that attach to the heatsink on the underside. Hold the channel that is now uppermost (to prevent it from falling once it has been freed) and remove the two screws from this channel only. Lie the LK2 down (correct way up) and remove the channel that you have just loosened – this can sometimes be tricky so follow these instructions:
  - Pull the board slightly toward the front of the unit until the 3-pin cannon input socket at the rear is clear of the back panel – it may sometimes be necessary to push the back panel slightly in the opposite direction until the socket is completely clear.
  - Lift the end of the board containing the 3-pin cannon socket upwards (see picture) until that end of the board is clear of the tray. Some delicate manoeuvring may be necessary, but don't force it.



- By carefully moving the board backwards & upwards, it should now be possible to lift it up and out of the tray.
- Repeat the above instruction for the other channel

## Step 2. Remove the heatsinks from the boards

1. Using the 5.5mm spanner or nut-runner, loosen the single nut/bolt found beside the 3-pin cannon socket (see picture below) – do not remove the nut completely, but loosen it to the point where only a very small amount of the bolt is protruding from one side of the nut.
2. The board is now held on to the heatsink by 4 allen screws or 4 nuts/bolts (see picture below).
  - If nuts/bolts are fitted, loosen them but do not remove them (as with single bolt above), pull the board upwards until there is a gap between the board and the heatsink and then slide the board to one side. If the board will not move easily, check that you have loosened all 5 nuts/bolts. If all are loosened correctly and it is still not free, the board may be held on by the heatsink compound and will require some slight pressure to free it.
  - If the board is held on by allen screws, completely remove all 4 screws, lift the board away from the heatsink and slide the single bolt beside the cannon socket sideways to free the board.

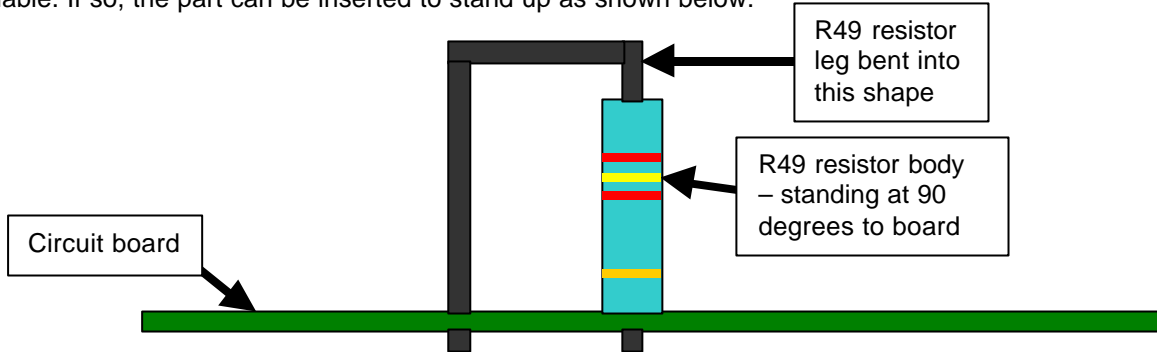


3. Use a tissue or paper towel to clean the heatsink compound from the board and from the heatsink (if you don't, you will find out very quickly that heatsink compound has a knack of ending up all over your clothes, hands, face etc)

**Step 3. Carry out the modification**

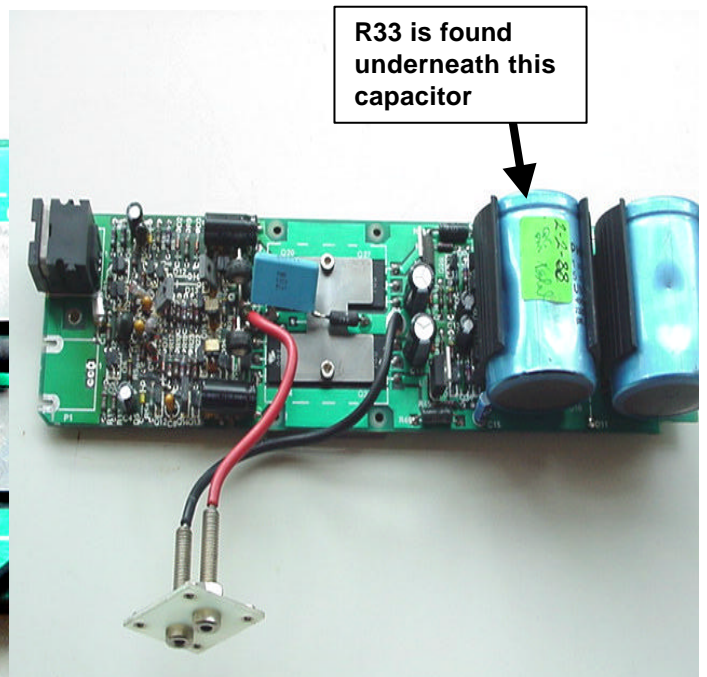
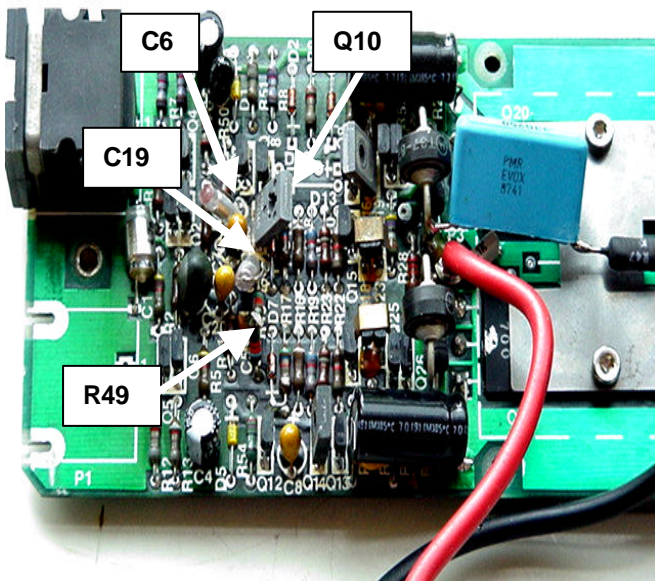
1. Locate the components as listed in the table below and replace with the values shown (see pictures below for location of these components). Do this for both channels.

**Please note – R49** – depending on what size of part you have purchased, it may be too big for the space available. If so, the part can be inserted to stand up as shown below.



**Please note – R33** is located underneath one of the big capacitors C16 (see picture below). The capacitor holder must be removed from the board to access the resistor. Turn the board upside down and you will see that the capacitor holder is held by two nuts/bolts. Remove the two nuts and the capacitor will come away from the board – but be careful, as it will still be held by a pair of wires. If the nuts/bolts keep spinning instead of coming loose, insert a medium sized flat-blade screwdriver under the capacitor and press it against the head of the bolt while turning the nut – this usually provides enough grip to hold the bolt so that the nut comes free.

Component	Replace with:
R33	20Kohm, 2.5Watt resistor
R49	2.4Kohm, 2.5Watt resistor
C6	68pF 160V Polystyrene capacitor
C19	220pF 160V Polystyrene capacitor



**R33 is found underneath this capacitor**

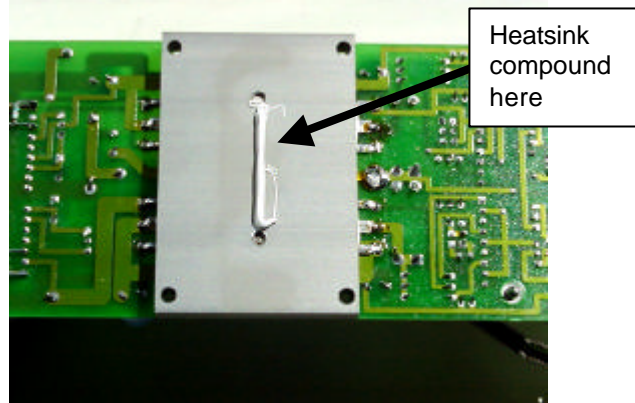
2. In order to prevent the two polystyrene capacitors that you have just replaced from failing at a later date, make the following small adjustments to the position of some components:
- Bend Q10 away from C6 (towards the middle of the board). As shown in picture above
  - Bend C6 away from Q10 (towards the 3-pin cannon socket). As shown in picture above
  - Bend C19 away from Q10 towards R49 but **do not** bend it too close to R49 – position it so that it is about half way between Q10 and R49. As shown in picture above

These steps are advised because Q10 and R49 get quite hot and can sometimes melt the polystyrene capacitors (over a period of many years). Positioning the components as above minimises the effect of this heat and prolongs the life of the capacitors.



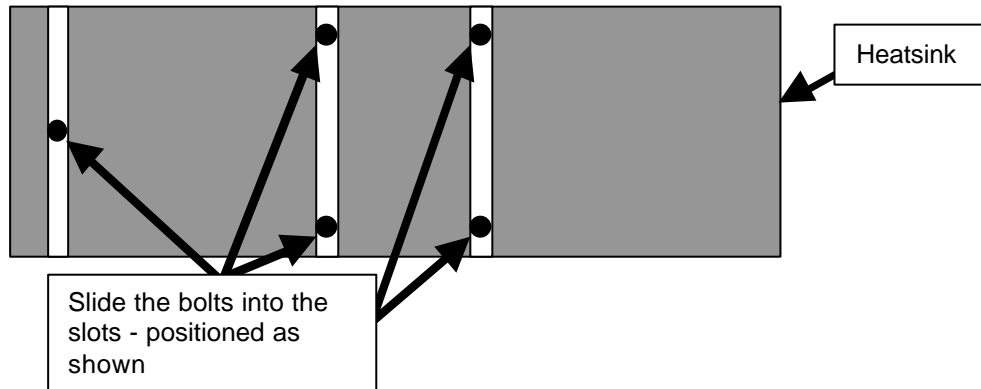
**3. Step 4. Re-assemble the LK2**

1. Re-attach the capacitor C16 that you removed to access R33. Use a medium sized flat-bladed screwdriver to hold the head of the bolt while you screw the nut back into place. Ensure nuts are tight as, if they come loose later, they may short out the circuitry while the unit is powered up and cause major damage.
2. Re-attach the heatsink:  
Apply heatsink compound in a single line along the centre of the coupling block as shown below

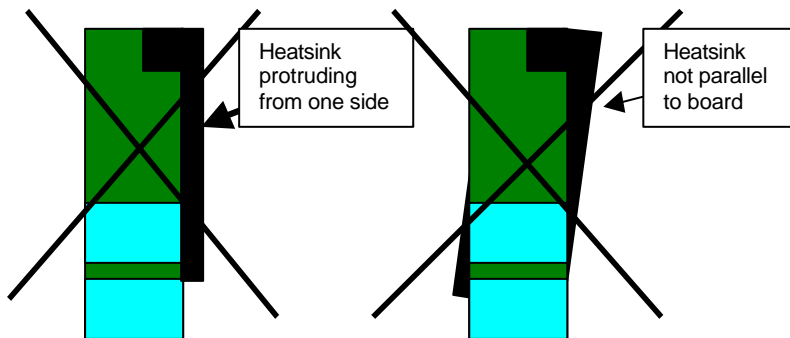


If board was attached to heatsink by nuts & bolts – follow the instructions below:

- Remove all five bolts from the board and slide the bolts into the slots, arranged as shown below



- Place the board onto the heatsink so that all the bolts pass through their respective holes on the board (some readjustment is usually necessary).
- Screw the nuts onto the bolts but do not tighten fully.
- Adjust the position of the board with respect to the heatsink so that the two are matched up – i.e. the two are parallel with each other and neither the board nor the heatsink are protruding at either side (see pictures below – exaggerated to show problems clearly)



- Once heatsink and board are matched up, tighten bolts.

If heatsink was attached with allen screws:

- Slide the single nut/bolt (still attached to board) into the middle of its slot – do not tighten
  - Rest the board on the heatsink in a central position.
  - Line up the screw holes in the board with those in the heatsink and screw in all four screws – but do not tighten fully.
  - Line up the board and heatsink so that they are parallel and level with each other (as diagrams above) and then tighten the screws fully.
  - Tighten the nut/bolt
3. Refit boards into tray – just do the reverse of the dismantling process described at the start of this document.
  4. Refit sleeve
  5. Test amp fully

