

Modifications to the Terratrip Professional Intercom Amplifier to Eliminate Alternator Whine.

The Terratrip intercom and associated headsets are a very effective and relatively low cost way of improving driver and passenger communications in a noisy car and also have the facility to take inputs from various SatNav products on the market as well as interfacing to two-way VHF radios.

The device does, however, suffer from a couple of irritating design defects, namely mobile telephone radio interference breakthrough and a background whine that is independent of headset volume setting and is caused by conducted alternator noise from the vehicles alternator. The noise is readily identified as the pitch varies with engine revs.

So far, a cure for the mobile phone radio interference breakthrough has proved illusive and, I suspect, would require a complete redesign on the electronics and packaging to keep the rf out. Fortunately the alternator whine has proved to be very easy to fix by making a couple of modifications to the internal printed circuit board.

Before investigating the design of the pc board, I had tried all manner of non-invasive methods of suppressing the whine including huge electrolytic capacitors across the supply and wiring directly to the car battery. Although the latter was an improvement, it by no means fixed the underlying problem and the background whine was still too loud for comfort.

These modifications have only been applied to and shown to work with the Terratrip Professional Intercom but may also be suitable for the Clubman range if they suffer from the same problem.

Background

The dual channel audio amplifier used in the intercom is a TDA2822, 8 pin dual inline integrated circuit. Each amplifier channel has differential inputs and it is the audio voltage difference between these two inputs that is amplified.

Due to the layout of the pc board, there is a long ground track that runs around the board and, because of the way that components are connected, it allows a noise voltage to be induced between the differential inputs. Because the alternator output carries a noise component, this noisy current flows through this track on the board and manifests itself as a whine on the output.

The solution was to reconfigure this bit of track between the two inputs and to reconnect the input reference grounds at a common point for each amplifier.

Procedure

Tools and parts you require are:

- medium sized pozidrive screwdriver,
- good quality, electronics sized soldering iron

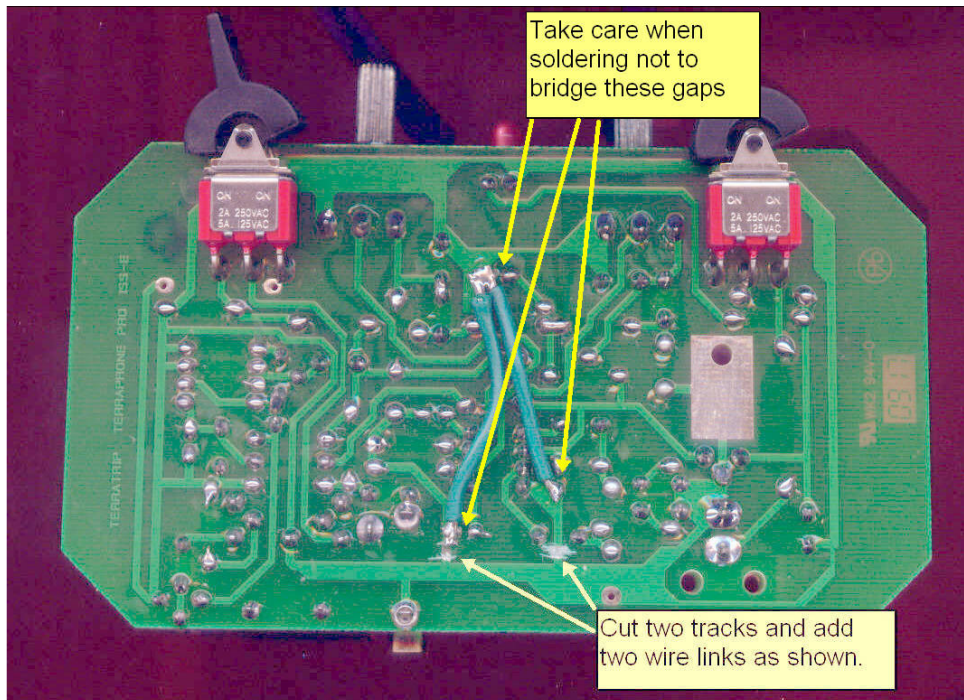
- multicore solder wire
- a small sharp knife or scalpel,
- tweezers
- a few inches of insulated wire which should not be too thin so as to keep the resistance down.
- Anti static safety wrist strap (recommended)

To open the intercom case, first you have to peel back the carbon effect label on the back panel at each corner to get at the four screws holding the back and front together. You could just carefully drill through the label with a 6.5mm bit but you will be left with four holes, which may or may not bother you. The corners can be lifted by gently teasing away with a small screwdriver, just enough to undo the screw with a medium sized pozidrive screwdriver. It might be possible to remove the entire label with a bit of care and some mild heat but it isn't really necessary and you run the risk of stretching the label, making it difficult to re-fit.

Once the screws are out you can gently pull the two halves of the case apart, taking care not to yank the headset wiring, which is quite thick and heavy, and to note which side each of the two cables comes out of the case.

Remove the two volume knobs - early models were secured with grub screws, later ones are just push on. Then carefully slide out the board.

Turn the board so that the switches are away from you and the track side uppermost.



Refer to the accompanying photograph to see where to cut the two tracks and solder the two wire links. They should be insulated wires to avoid shorting out any other connections.

The tracks can be very carefully cut, preferably with a sharp scalpel or small Stanley knife. Make two cuts, approximately 3mm apart, across and through the copper strip. Then, gently lift one edge of the small piece of track to be removed with your knife and peel off, possibly aided by a pair of small tweezers. Make sure that you have cut right through the track, but no further, and take care not to lift or damage the remaining tracks. Repeat for the second track.

Once the tracks portions have been removed, make sure there are no bits of cut track floating around the board and then prepare the two wire links and solder them in place. Take care only to apply sufficient heat to solder the wires in place as too much will cause the tracks to lift from the board or may damage other components.

Check thoroughly that the links are properly soldered and that there are no solder splashes or other possibilities for the links and new connections to cause a short circuit anywhere on the board. Particularly make sure that the wire insulation isn't pressing hard against another component's solder wire end, which might, in time, cut through the insulation and cause problems.

Re-assembly is simply the reverse of taking it apart, again taking care with the headset cables. After tightening the fixing screws, it should be possible for the rear plate to be pressed back into place with the original adhesive. A bit of gentle heat may help, or add a bit of suitable glue.

All being well, when you test the system it will be whine-free with the engine running.

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