

C.C. J.L.

M. Purnell
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Mr J Lamb
Viamed Limited
05/11/2001

Dear John,

Enclosed is a letter sent to you at the beginning of production of the latest Microstim. If you remember an additional capacitor was added across the audio feedback zener diode to prevent the stimulator producing audio on open circuit.

Unfortunately, I have now discovered an additional problem with the same part of the circuit. Before explaining, I am convinced that no user or members of your sales or maintenance staff have ever noticed the anomaly and as such I do not feel that a recall or information to the user is necessary except if reported. I only noticed the following when inspecting a stimulator purchased by Manchester Royal Infirmary.

The anomaly is that when the Viamed patient lead is plugged into the stimulator but not connected to the patient, the audio is initiated when the switches are pressed. This should only occur when a patient is attached to the lead to indicate current flow. My test circuit does not show the anomaly as I do not incorporate a Viamed patient lead in the rig.

The explanation is as follows. The input to the chip has capacitance that varies from chip to chip. This capacitance is in series with the open circuit output capacitance, a potential divider therefore exists and when the stimulator is initiated a voltage large enough to initiate the audio is present. The additional capacitor (4.7nF) placed permanently across the zener diode (input to the chip) reduced this voltage and the audio does not occur. However, the construction of the patient lead is such that when plugged in, the additional open circuit lead capacitance now causes the voltage at the zener to rise again and the audio is once again initiated when the switches are activated.

If the initial additional capacitor had been large enough the additional capacitance of the lead would not have been relevant. The problem has been overcome by increasing the 4.7nF capacitor to 0.47 uF. My opinion is that the wisest option is to make a capacitor change to those being returned for repair and I make the modification to all new stimulators in production. If a user notices and complains then the modification can be done on return.

I have already modified the latest 25 being sent and identified them internally with a red mark on the circuit board. I now require a change to the parts list to reduce the 4.7pF capacitors (DB15) required from 50 to 25 and a further 25 capacitors of 0.47uF adding.

I apologise for the inconvenience

Regards,



M. Purnell

P.s. Could you inquire if a purchase of circuit boards is due yet from your manufacturer. If you recall, from my previous letter, we require the extra pads next to the zener diode to take the capacitor.

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Mr J Lamb
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Dear John,

please find enclosed details of a minor addition to the Microstim DB. The prototypes did not exhibit a phenomenon which appeared on production and can be attributed to different chips having slightly different sensitivities.

Audio occurs by feeding back a fraction of the output pulse across a 3.9V zener diode in series with the patient. I.e. no patient load - no feedback and hence no audio. However, it was noted that a minority of stimulators produced an audio noise although the device was open circuit. Investigation showed that an open circuit spike was enough to trigger the audio input. A small capacitor 4.7nF, the same value as C4 (DB15), was placed across the zener diode and the problem disappeared. Both the first and the second batch of 25 (under completion) have had the capacitor added by soldering it onto the back of the circuit board. Although it looks perfectly professional, if you thought necessary, a small modification could be done to the circuit board when a new batch of boards is ordered from the suppliers. The addition is not a product change as all production has the capacitor. The only change is an additional capacitor (C1) on the circuit diagram.

Enclosed is the modified circuit diagram and layout together with a photo of the present location of the capacitor. A proposed modification to the circuit board which is two pads next to the zener diode is also enclosed if required.

Regards,

M. Purnell