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Number 25

APPLICATION NOTE

Use of Stabilant 22A on Plastic Element Potentiometers

Introducing Stabilant 22

Stabilant 22 is an initially nonconductive block polymer which when used in a thin film between metal contacts becomes conductive under the effect of an electrical field. This occurs at an electric field gradient such that the material will remain nonconductive between adjacent contacts in a multiple pin environment. In addition, Stabilant 22 exhibits surfactant action as well as lubrication ability, providing a single component resident solution to virtually all contact problems.

When applied to electromechanical contacts, Stabilant 22 provides the connection reliability of a soldered joint without bonding the contact surfaces together.

This Application Note addresses issues unique to potentiometers that use a plastic resistive element and how their reliability can be improved with Stabilant 22.

Background

While plastic element potentiometers and faders have major advantages over the step type units, they do require some lubrication to extend their trouble free life. Problems associated with malfunctioning or dirty elements include noise, microphonics, mis-tracking of dual controls, and even dropouts. A mostly neglected concern has been the effect of thin film contamination on the level of harmonic distortion of the audio signal, including THD and the tendency of distortion to occur more in the easily audible higher order harmonics. Stabilant 22 addresses all of these problems.

Signal distortion caused by thin-film contaminants

Thin film contamination can increase contact resistance, but another problem arises: As an alternating current signal voltage passes through the zero voltage state, current ceases to flow through any purely resistive load. If a thin film of contamination is present, current may only begin to flow again once a sufficient voltage has built up – the breakdown voltage of that substance. The result is a small notch in the signal, which in audio has a sound similar to the notch distortion of a class D power amplifier.

The characteristic sound ranges from a "grainy" quality up to a harsh "glassy brilliance" overlaying the music. Stabilant 22 prevents this by keeping contaminants away from the contacting surfaces.

The use of Stabilant 22/22A

Stabilant 22A is thin enough to distribute the concentrate evenly in a potentiometer, creating a lubricating film. However, the isopropyl alcohol diluent can adversely affect many plastic element types. A suitable water diluted mixture can be used in this case. Add three parts of hot water to one part of Stabilant 22 (the concentrated form), mix thoroughly, and allow it to cool before use. Apply a small amount (one drop is usually enough) and vigorously cycle the fader to distribute the film along the entire length of the track.

This is a case where more is *not* better - if the film thickness is too great, hydroplaning could occur, in which the contacts push a film of the lubricant ahead of them, causing it to build to a thickness that breaks contact between the wiper fingers and the plastic element (partly due to the low contact pressure in these types).

Simple verification that audible distortion has been reduced

If you want to do a comparison of the distortion effects of thin film contamination, it is suggested that one input channel (of a multichannel system) be treated. Treat all the switches, connectors and even IC sockets with Stabilant 22. (Use Stabilant 22A where it is more convenient, but see precautions, below). Compare this channel with an untreated channel. The difference is usually audible as a smoother more musical sound on the treated channel.

Precautions

Again, keep the film thickness to a minimum. Stabilant 22A should only be used on plastic element faders if the manufacturer OK's the use of isopropyl alcohol (isopropanol), which is a common cleaner in electronics service.

Reference

Please also refer to the following for related details:

- Technical Note 24: "Effects of Stabilant 22 on Harmonic Distortion in Connectors"
- Application Note 4: "Microphone Connectors"
- Application Note 3: "Shadow Switches"
- Application Note 11: "Recording Studios"
- Application Note 12, "Broadcast Equipment"

NATO CAGE/Supplier Code 38948

5mL Stabilant 22 (Concentrate), NATO Stock Number 5999-20-002-1112

15mL Stabilant 22 (Concentrate), NATO Stock Number 5999-21-909-9981

15mL Stabilant 22A (Isopropanol Diluted), NATO Stock Number 5999-21-900-6937

15mL Stabilant 22E (Ethanol Diluted), NATO Stock Number 5999-21-909-9984

Stabilant products are patented. Because the patents cover contacts treated with the material a Point-of-Sale license is granted with each sale of the material.

SAFETY DATA SHEETS ARE AVAILABLE ON REQUEST

NOTICE

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