STABILANT 22

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**Number 38**

# APPLICATION NOTE

## Design goals during the development of Stabilants

- *Background*

In 1976 we, while manufacturing audio equipment, encountered major problems with switches which were being used at very low signal levels. Although mechanically efficient, they demonstrated excessive RF demodulation effects, thin-film distortion anomalies and intermittent microphonics. All attempts to rectify these problems by cleaning or the application of protective materials (such as oils), had only a short-term palliative effect.

Because we were working with audio voltages as low as 80 microvolts, into impedences of from 40 ohms to 47 Kohms, we also encountered unsatisfactory behaviour from the connectors used in the system.

Being aware of the probable evolution of low-power (CMOS) logic and the burden this would place on connector systems, we decided in 1977 to develop a coating treatment which could be applied to electro-mechanical contacts in order to make them more reliable.

- *Goals*

We set forth several goals for the material: *(not in order of importance)*

1) It had to be easy to apply.

2) It should have a long life, both on the shelf and in actual use. (>> 5 years)

3) It should be very stable, especially in its resistance to "varnishing" due to cross-linking caused by the presence of: sulphur or sulphur-compounds on or in the vicinity of the contacts, the presence of other curing agents either in elastomers or plastics used in the connector or switch construction, or airborne contaminants cross-linking-initiation compounds.

4) While the material should be capable of providing a limit to the degradation of the connector this limit should be sufficiently close to the normal "New-condition" operating limit such that it would be within the connector's operational envelope.

5) The material should have a switching-gradient of between 10,000 and 15,000 volts/inch when applied to insulating systems such that its "unswitched" presence would not cause leakage between adjacent contacts, yet it should have a low effective volume resistance when in the "switched" condition.

6) The material should be a good lubricant.

7) The material should have the ability to permeate and/or lift corrosion by-products from the active surface of connections and keep the material in suspension for very long periods of time and so prevent RF rectification and thin-film distortion effects.

8) The material should be non-toxic.

9) The material should not require dilution with any CFC or other environmentally sensitive solvent such as tri-chloro-ethylene in order to provide a surfactant action. If it had to be thinned in order to produce the desired film thickness, any diluants needed should be as non-toxic as possible.

10) The material should not cause any adverse effects on any plastic used in the electronics industry.

11) The material should be compatible with the majority of the elastomers used in the electronics industry.

12) Ideally, the vapor pressure should be low enough so that it could be used in satellite applications without having to be concerned with out-gassing.

13) The material should have a temperature envelope of from -70°C to at least +170°C.

- ***Summary***

It took us from 1977 to 1982 to develop such a material and to satisfy ourselves that we had met the design parameters. Extensive field testing was done during the development and the material was released to the Canadian Armed Forces in 1983 for trials as well as being introduced to the consumer electronics market at that time.

NATO Supplier Code 38948 - 15 mL S22a size has NATO Part # 5999-21-900-6937

The **Stabilants** are patented in Canada - 1987; US Patent number 4696832. World-wide patents applied for. Because the patents cover contacts treated with the material, a Point-of-sale License is granted with each sale of the material.

**MATERIAL SAFETY DATA SHEETS ARE AVAILABLE ON REQUEST**