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Number 1

APPLICATION NOTE

Use of Stabilant 22 in Electronic Equipment

- *What is Stabilant 22?*

Stabilant 22 is an *initially non-conductive* 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 *non-conductive* 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 can provide the connection reliability of a soldered joint without bonding the contact surfaces.*

- *Where can Stabilant 22 be used?*

Stabilant 22 can be used in all types of connectors, at frequencies from to DC to several gigahertz, on faders or potentiometers, or in non-inductive (non-arcing) power-interrupt switches. The number of uses are almost limitless.

- *Is Stabilant 22 just another contact cleaner?*

No, **Stabilant 22** is a *resident* potentially *electrically-active* material which through a synergistic combination of effects enhances conductivity within a contact without causing leakage between adjacent contacts. Thus large quantities of the material do not have to be "hosed" on as is the case with cleaners.

- *Is Stabilant 22 cost effective?*

As **Stabilant 22** can be quickly applied to all contacts and connectors in a system, the often difficult diagnostic determination as to which one of many contacts are erratic, can often be eliminated. This can significantly reduce service time in the field and in many cases eliminates the need to return boards for shop service or re-manufacturing. As any service manager knows, the diagnosis of electronic problems, especially where intermittent failures are concerned, is often much more difficult than the actual part replacement; as well as requiring service personnel of exceptional caliber. In many cases the use of **Stabilants** can thus increase the efficiency of existing staff as well as allowing many connector harness related problems to be handled at a much lower cost.

Many of our users have reported savings of from \$250 to \$3000 as a result of using \$3 to \$5 of the material.

In many electronic applications demodulation (detection) of RF signals in connectors exhibiting thin-film rectification effects can either reduce the signal-to-noise ratio or introduce artifacts which can disrupt data flow. **Stabilants** can cure these.

While **Stabilants** have demonstrated that they can cut the cost of both shop and field maintenance; their use in the manufacturing of electronic systems can speed up production as well as reducing rejections.

- *How does Stabilant 22 work?*

Contact failure is rarely caused by a single factor. Thus, treatments that solve only one problem don't necessarily offer a reliable long term solution. For example, cleaners do not prevent the re-entry of contaminants or the reformation of contaminant films; nor do they offer any lubrication. They must be used each time a connector gets dirty. Lubricants in themselves are rarely cleaners. Corrosion inhibitors are neither cleaners nor lubricants and are often specific to one type of metal or plating. Unsaturated oils used as contact treatments can cross-link under the influence of elastomer or thermoset plastic curing agents and accelerants.

While resident in the connector, **Stabilant 22** performs several concurrent functions. Its very presence in the contact gap will prevent the entry of outside contaminants. It has sufficient surfactant action to lift surface contaminants and hold them in suspension. In cases where corrosion products are present **Stabilant 22** will penetrate them and prevent rectification effects. Due to its high dielectric constant it will act to form a capacitive layer which is in parallel with whatever residual resistance exists in the contact increasing the passage of AC signals. Given sufficient DC bias within the gaps of the contact the thin film of **Stabilant** will "switch", conducting by quantum tunneling and thus limit the resistance of the contact to a serviceable level.

- *In what forms is Stabilant available?*

The **Stabilants** are available in two forms; as a concentrate (**Stabilant 22**) and as an isopropyl alcohol-diluted form (**Stabilant 22A**). Because of the 4:1 dilution, a given size container of **Stabilant 22A** will cost about one-fifth the amount of a container of **Stabilant 22** as it contains only one-fifth the amount of the concentrate. A third packaging is available. **Stabilant 22S** packages the concentrate such that it occupies one-fifth the volume of an otherwise empty container. This allows the end-user to add his own diluant and saves the added costs of shipping isopropyl alcohol, as well as allowing the end-user to use an alternate diluant such as one of the Freon™ solvents. In addition a 1/2 mL vial of **Stabilant 22A** is available for manufacturers to include with plug-in circuit boards.

- *What is the difference in use of these materials?*

Stabilant 22 is most useful where the connections are out in the open - such as card-edge connectors or where the lubricating properties of the material are useful - such as an aid to installing microprocessor IC's or on switches. Where the connections are not too easy to get at or where the user wishes to apply the material to something such as a socketed IC (without removing the IC from its socket) it is easier to use the alcohol diluted form (**Stabilant 22A**). The isopropyl alcohol diluant serves ONLY to carry the concentrate into the connector.

- **What packaging is available?**

Many manufacturers make large volume purchases, diluting the material for specific applicators used on their production lines. We can supply the concentrate (**Stabilant 22**) in 15mL, 50mL, 100mL, 250mL, 500mL and 1 Liter bottles. The dilute (**Stabilant 22A**) is available in 50mL, 100mL, 250mL and 500mL containers. We do not have a 1 liter container of the dilute as 500 mL is the largest size bottle that can be shipped by air (in single or multiple packages) without additional restrictions. We maintain our stock in depth and ship most orders the same day they are received. For companies which want to use the material as a stock store item we can produce custom labels with your part or stock number. The 15 mL sizes are in dropper bottles, and these are available on request for the 50 mL sizes as well.

Custom labeling has been provided for many manufacturers who wish to assign their own stock control number, or to distributors who wish to market the product under their own logo. Obviously this requires purchase in of the product in suitable quantities.

- **Is it available in a spray can?**

No. Why waste the material? We would like to think we are environmentally responsible and safety conscious. This ruled out the use of either a chlorofluorocarbon or a highly inflammable mixture of butane and propane as a propellant.

*In addition even **Stabilant 22A** has only about 1/200th the solvent impact as conventional contact cleaning solvents over a three year time span. As **Stabilant 22** contains no solvent it has absolutely minimal environmental impact and is, therefore, becoming the treatment of choice for many service organizations!*

- **Just how much should be used?**

Normally, a final film thickness of from 1 to 2 mils of the concentrate is all that is necessary. In other words, you want just enough to fill up the interstices between the contact's faces. When using **Stabilant 22A**, use enough so that once the isopropyl alcohol evaporates the desired 1 to 2 mil film of **Stabilant 22** remains.

In applications to moving surfaces, such as in slip-rings or potentiometers, film thickness should be minimized to the point where "hydroplaning" won't occur.

- **What is the 15mL service kit?**

This was made up at the request of several manufacturers who wanted a standard kit that they could issue to their service personnel. It consists of a 15ml dropper bottle of **Stabilant 22A** and some applicators, all in a small capped cardboard tube that can be tossed into a tool box without damage. As noted, we can provide these kits with special labels when large volume orders are involved.

- **How can I be sure that Stabilant works?**

The best way to find out just how well it works is to try it out; that's why we have samples available. Almost every service shop or manufacturer has equipment available where the switches or connectors have become erratic over the years. Use **Stabilant 22/22A** on them and satisfy yourself. A word of caution. **Don't** try to evaluate **Stabilant 22's** performance on brand new connectors. Instead, use it on

connectors that are corroded, or dirty or just plain unreliable. We are sure that any organization dealing with electronics will have at least one piece of unreliable equipment on which the **Stabilants** can be tested!

- *What is the effect of Stabilant in audio equipment?*

Generally it makes a audible reduction in the "grain" of the sound, where a lot of connections are involved such as in a recording studio, the sound is usually much more open and clean sounding, with a noticeable improvement in signal to noise ratio. The material is especially effective on Schadow™ and similar switches, as well as on plastic element or wirewound faders. We have been told of many cases where older consoles have been improved to the point where they are back on line, and even some where they sounded better than their replacements!

- *What is the effect of Stabilant in video and CATV equipment?*

In video applications, the pedestal level is usually improved; often there is a noticeable improvement in detail indicating that the signal's rise time is also shortened. In CATV applications the use of **Stabilants** can cut customer complaints, speed field service, and reduce RF leakage from connectors,

- *What is the effect of Stabilant when used in computers?*

The effect of the **Stabilants** in Computers is to reduce the number of times the system locks-up or crashes, sometimes it even eliminates non-software crashes completely. The material can be used on card-edge connectors, socketed IC's and in the peripheral connectors such as IEE-488A, RS-232C, & Parallel ports. Its use in LANs can often mean major reductions in service costs as well as cutting re-transmissions due to parity errors.

- *What is the effect of Stabilant when used in test gear?*

Used on socketed IC's, photo-isolators, rotary/push-button/slide switches and on any connectors, the net effect is to virtually eliminate intermittent problems. With IEEE-488A bus controlled equipment it reduces the potential for system lock-ups.

- *Can Stabilant be used on robotic equipment?*

Yes, not only can it be used on the circuit cards, but often older robotic equipment suffers from erratic contacts in the connections between the electronics section and the actuator part of the equipment even though most of these connectors are of the environmentally sealed type. Shielding case covers are often used to prevent electrical interference from welding equipment and the like. **Stabilant 22** is frequently used to ensure that the covers make electrical contact with the case.

- *What about Stabilant in avionics, navigation equipment and similar applications?*

Stabilants have been used in the maintenance of ILS, DME, VORTAC, Loran C, both conventional and digital radar systems in both mobile (seaborne & airborne) or fixed facility operations in addition to use on HF, VHF, and UHF communications equipment.

- *Has Stabilant been used in mobile communications or paging?*

Yes, not only is it being used by a number of police forces in servicing their communications equipment it is being used by industry as well.

- *Is Stabilant hazardous to use?*

Stabilants have very low oral toxicity. Under normal workplace conditions no skin sensitization effects have been noted. In the undiluted form, it is non-flammable although if heated above 200° Celcius the decomposition products would burn. And **Stabilants** are environmentally friendly materials.

- *Can Stabilant be used by untrained personnel?*

Thousands of applications of the consumer version of **Stabilant 22** have been made over a period of several years now without any reported problems.

- *What is the best way to apply Stabilant to a contact?*

The 15ml container has a "dropper" type cap that allows **Stabilant 22A** to be applied directly to such components as socketed IC's, switches, connectors, etc. Some end users prefer to use industrial syrettes to apply the material. Camel's hair brushes can be used to brush it on card-edge connectors or they could be dipped into the dilute material. Most metering-type liquid dispensing systems can be used as well.

- *Does the action of Stabilant deteriorate with age?*

In some field trial applications lasting over ten years **Stabilant 22** has shown no sign of reduced effectiveness. With a high molecular weight and a very low vapor pressure, little is lost by evaporation. Unlike some other contact protection oils, **Stabilant 22** will not cross-link when exposed to free-machining materials such as high-sulphur brass, or when used on contacts where agents used to promote cross-linking of thermosets or elastomers are present in the environment or in the actual connector components. Unlike non-saturated oils, **Stabilant 22** does not "varnish".

NATO Supply Code 38948 - 15 mL of S22A 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

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