Stabilant 22 Contact Enhancer Application Notes

App. Note 6 - Bio Medical Electronics

General:

With the steady increase in the level of sophistication of biomedical electronic equipment there is a greater reliance on plug in modules and the use of microprocessor control in that equipment. While the reliability of the individual components such a IC's, transistors, resistors, and capacitors has improved, the connectors used in the equipment still represent the weakest link in the design. The use of plug-in cards and/or modules does allow defective cards and/or modules to be replaced quickly but at the expense of introducing additional sources of unreliability-the connectors.

Where microprocessor control is used, a single marginal contact among the hundreds often employed can cause the system to crash and often it is next to impossible to find out which contact is responsible.

The cost of biomedical electronics has risen very quickly and with a general tightening of hospital budgets the service of the equipment is often done under some pressure. This combined with the increasing average age of equipment has made it increasingly difficult for the personnel required to keep the instruments on line

Because greater demands are being placed on complex biomedical equipment even connector-caused problems such as intermittent faults, or lack of reliability can be intolerable and well as being difficult to isolate and repair.

As is the case with other electronic applications what was needed was a non-toxic material that could be applied to connectors without concern about bridging between adjacent pins, a material that would actively enhance the conductivity of each pin and socket, and which would improve the performance of the connector by reducing microphonics or noise generated within the contact means. Ideally, the material should be easy to use and apply, should require no exotic dispensers and when used on connectors made, for example, of plated free-machining brass should show no tendency to cross-link under the action of the sulfur in the brass. This effect is called "varnishing" and is not uncommon among the connector treatments employing a vegetable oil such as a modified palm oil.

What are Stabilant 22, 22A, 22E, and 22S?

Stabilant 22 is a unique, *initially non-conductive* block polymer that has the property of *becoming conductive* when used in the tight confines of a contact, while staying non-conductive between adjacent contacts. The film of **Stabilant 22** has the viscosity of a medium oil and has reasonable lubricating properties making it ideal in slide or rotary switches not to mention a good preventative of bent pins when inserting IC's in their sockets.

To put it simply, Stabilant 22 will impart the electrical qualities of a soldered joint without creating an actual bond!

The material is packaged in several basic forms: as a concentrate (**Stabilant 22**), **as** a diluted material (**22A, 22E, or 22L**), and in a partially filled bottle of concentrate **(Stabilant 22S**) allowing the end-user to add the solvent of his choice.

Stabilant 22 is the actual block-polymer, which we refer to as the concentrate, and can be used directly where lubrication is an important consideration.

Many customers find it more convenient to use **Stabilant 22A** which is the isopropyl alcohol diluted form of the material (cut 4:1 by volume). The viscosity of**Stabilant 22A**, and **22E**, are much lower, allowing them to be used, for example, on socketed IC's without removing the IC's from their sockets.

Where other solvents are preferred, **Stabilant 22S** can be supplied. Here, the concentrate occupies about one-fifth the bottle's volume simplifying the housekeeping problems in adding special diluants to the concentrate. **Stabilant 22** is quite soluble in alcohol's, perchloroethylene, or the Freons(TM).

The **Stabilants** do not affect elastomers save for some slight swelling on some materials, the diluants employed are much more likely to cause problems. Almost no plastic is affected by the concentrate, although some plastics are affected by long exposure to isopropanol. We do not recommend the use of the Stabilants on low-cost deposited-carbon-film type potentiometers.

Where are the Stabilants used?

Briefly, the **Stabilants** can be used on virtually all low-voltage connectors or switches wherever a mechanical contact has to carry an electrical current. They are at their most valuable when used on micro-power circuits such as CMOS logic. The only employment that is contra-indicated is their use in a "Shotgun Application" approach where inter-contact voltages of greater than 100 volts are encountered. This does not prevent them from being applied to individual pins, but they should not be allowed to spill across the inter-conductive surfaces at voltages of greater than 100 volts. Too high a field strength could cause the "switch to conductive state" effect to occur. For this same reason some caution should be used where a connector assembly (in the 100 volt plus applied voltage class) is so designed that there are narrow cracks running between contacts; narrow cracks which could fill with **Stabilant** through capillary action.

Because the switching speed is very slow, in the typical order of several seconds there is no discernible harmonic distortion introduced by the **Stabilants**except at frequencies lower than several seconds per cycle. Indeed the **Stabilants** are

used in recording equipment to reduce distortion and improve signal to-noise ratios by eliminating thin film rectification artifacts from mechanical connections.

They may be applied to socketed IC's and transistors, edge card connectors, rack and panel connectors, 'D' type connectors, co- axial and tri-axial connectors such as BNC'S, slide switches, rotary switches, key switches (a major use in the computer industry is in servicing keyboards) to name but a few.

Bio-medical electronic equipment on which Stabilant has been used:

Patient monitoring equipment such as ECG and respiration monitors, Defibrillator Infusion Pumps, EEG equipment, Scanners, Ultra-sound equipment, Recording equipment, and computers. (to cover but a few)

Results:

Our customers report that in many cases, defective equipment could be returned to service once its connectors were treated with **Stabilant 22**, and from that point on, its reliability as expressed in mean time between failures, was generally much greater. They have also commented on their practice of treating all the connections on a piece of out-of-service equipment before resorting to more orthodox troubleshooting. As noted, this very quick and easy treatment is all that is needed in many cases and has cut the servicing load substantially.

In new installations of complex computer-controlled networks of monitoring equipment, combining existing plant with new plant, the use of **Stabilants** has often reduced the initial trouble shooting period from several weeks, to under a day!

Revision 5

Stabilants are a product of Dayton Wright research & development and are made in Canada

NSCM/Cage Code - 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 pending. 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

NOTICE: This Application Note is based on customer-supplied information, and D.W. Electrochemicals is publishing it for information purposes only. In the event of a conflict between the instructions supplied by the manufacturer of the equipment on which the Stabilant material was used, and the service procedure employed by our customer, we recommend that the manufacturer be contacted to make sure that warranties will not be voided by the procedures.

While to our knowledge the information is accurate, prospective users of the material should determine the suitability of the Stabilant materials for their application by running their own tests. Neither D.W. Electrochemicals Ltd., their distributors, or their dealers assume any responsibility or liability for damages to equipment and/or any consequent damages, howsoever caused, based on the use of this information.

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