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**Number 44**

## **APPLICATION NOTE**

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### **Use of Stabilant 22 for SCSI/SCA Removable Drive Systems**

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#### **Background**

SCSI (Small Computer Systems Interface) is a connection and signalling specification for disk drives that specifies a group of interfaces and the connectors used in drive electronics and computers. Since its introduction, SCSI 2 and SCSI 3 have been introduced, along with many other variations on the original standard. Common SCSI connectors have pin counts including 50, 68, or 80.

Some examples of the use of SCSI drives are multi-channel sound recording (where they replace tape drives) and digital recording as used in animation. The availability of SCSI units with removable hard drives allowed digital recordings to be removed - at a later time, media can be copied, edited and assembled. With SCSI drives in removable caddies, their connectors for power and high-speed digital signals are vulnerable to wear and environmental corrosion problems. The need for higher speed to store higher-resolution data led to move from SCSI 2 (50-pin) to the adoption of SCSI 3 types, with 68-pin connectors (with smaller pin spacing) - more opportunities for any connector failure to cause trouble.

The SCSI 3 standard allowed larger numbers of drives to be connected to the bus. Where larger arrays are involved, these are usually plugged into a back plane by using a single unified 80 pin connector. This technique is termed SCA connection. The low voltages, high speed (frequency) and the requirement for bus-termination in these systems makes them even more dependent on reliable connector performance.

#### **What is Stabilant 22?**

Stabilant 22 is a liquid block polymer developed for the enhancement and protection of electrical contacts. It is non-conductive in bulk, but when used in a thin film between metal contacts becomes conductive under the effect of an electric field. This occurs at an electric field gradient that allows the material to remain non-conductive between adjacent contacts in a multiple pin environment. In addition, Stabilant 22 exhibits surfactant action and a lubricating quality providing a simple 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.

## Connector problems

Connector faults can be as subtle as impedance mismatches in terminators (with occasional signal reflection), so errors may not show up immediately. But when the 68-pin caddies or removable SCA 80-pin drives are used, faults can accumulate until error detection/correction measures cannot "keep up". While connector issues may be at fault, the software may determine that an entire disk drive should be replaced!



*Assorted SCSI Connectors - photo by Dave Fischer*

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Note that the use of the RAID technique (Redundant Arrays of Inexpensive Drives) usually allows for "hot swapping". In essence this means that defective SCA drive can be replaced without powering down the system.

As the larger storage systems use error correction (RAID level 3+), it isn't until a number of the records fail that a major problem becomes apparent. But in some cases, faults may be of an intermittent nature and thus difficult to trace. Stabilant products can be used to prevent many of these problems by making connectors reliable.

On some connectors, the metal may be tin plated, with several sets of gold flashings applied after the tin plated connector is formed. However, when a connector's stock is tin plated before it is formed one must remember that some tin alloys resist high-speed forming and can have areas of latent stress. Whenever this type of connector is subject to thermal stress and/or cycling of humidity, the pre-stressed tin may flake away. These flakes are usually microscopic. We have encountered instances where connectors passed quality control testing and were approved for shipping. Often these connectors were bulk shipped in cartons not manufactured from acid-free stock. In time, with exposure to sulfur compounds, the tin plating started to "micro-flake", and these connectors became erratic.

We recommend the use of Stabilant 22 on these connectors.

## Removal and cleaning of back plane boards

Disassembly must include precautions to prevent damage of components by static electricity. Hard drives will have to be removed from the plug-in SCA carriers. We advise application of Stabilant 22/22A to all of the connectors before reassembly.

It is advisable to note/label each hard drive and SCA connector during disassembly.

While thorough labeling of connections may seem pedantic, the use of any Quality Assurance Program (such as one of the ISO's) requires such methodology. In systems that mix SCSI versions (differences in termination, voltages, etc.) it can be critical to reassemble using all of the original connection ordering.

## Cooling fans

Most caddies that are used with high capacity hard disk drives are fan cooled. Any failure of the power supply to fans (level or regulation) can lead to premature failure of one or more drives. Such problems may originate from connector failure, or from parts inside the supply (e.g., electrolytic capacitors failure or overheating). Stabilant treatment of power supply connectors can mitigate many of these.

## Where else can Stabilant 22 be used?

Stabilant 22 (or 22A) can be used in all types of connectors from card-edge to screw terminals. It works well in DC circuits and at frequencies up to several gigahertz. It has been used on faders/potentiometers, and for switches (signal switches or in power-interrupt switches for noninductive loads). The number of industries using Stabilant 22/22A is growing – to name a few: avionics, automotive, computing, process control, and such critical fields as biomedical electronics, air traffic control, police & emergency communications.

NATO CAGE/Supplier Code 38948

15ml Stabilant 22 (Concentrate), NATO Part # 5999-21-909-9981

15ml Stabilant 22A (Isopropanol Diluted), NATO Part # 5999-21-900-6937

15ml Stabilant 22E (Ethanol Diluted), NATO Part # 5999-21-909-9984

The Stabilants 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**

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