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APPLICATION NOTE

Use of Stabilant 22 for SCSI/SCA Removable Drive Systems

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 problems that may affect SCSI type connection systems and how Stabilant products can help to improve their reliability.

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 were introduced, along with many other variations on the original standard. Common SCSI connectors have pin counts including 50, 68, or 80.

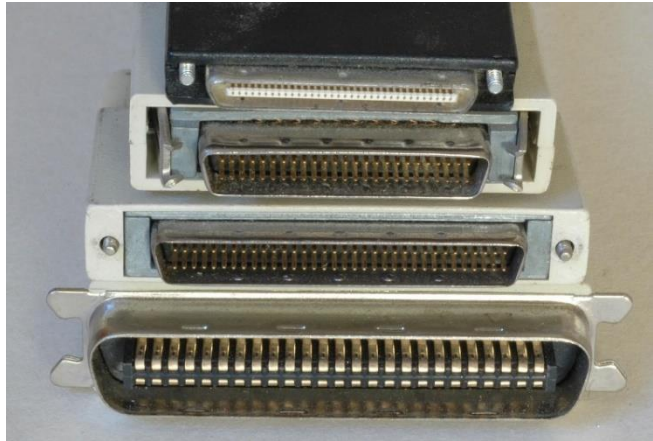
Some examples of the use of SCSI drives are multi-channel sound recording (often replacing tape units) and digital recording as used in animation. SCSI units included removable drives (even hot swap types) allowing digital recordings to be removed - at a later time, such media can be copied, edited, etc.

SCSI drives in removable caddies introduce larger numbers of connections, especially with the adoption of SCSI 3 (replacing 50 pin connectors with 68 pin types). These are more vulnerable to wear and environmental corrosion problems than internal drives. We recommend Stabilant 22 treatment of such connectors to address the increased concern for all types of connector trouble, in addition to standard handling precautions.

SCA (Single Connector Attachment) was introduced following the SCSI 3 standard, providing power and data connections in a single 80 pin connector. This facilitated the use of larger numbers of drives on the bus, usually plugged into a back plane. The low voltages, high speed (frequency) and the requirement for bus termination in these systems makes them even more dependent on reliable connector performance.

Connector problems

Connector faults can be as subtle as impedance mismatches at the line terminators (with occasional signal reflection). Errors may not show up immediately. But when the 68 pin caddies or removable SCA 80 pin drives are used, faults can accumulate until the ECC measures (error checking and correction) 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) in larger storage systems usually allows for hot swapping. Here, any such SCA drive can be replaced without powering down and system software handles the rebuilding of the RAID disk volumes. The ECC systems are designed to deal with faults on the drives themselves, not necessarily with bad connectors in mind.

In storage systems using RAID (level 3+), it isn't until a number of the records fail that a major problem becomes apparent. But in cases of connector trouble, faults may be of an intermittent nature and thus difficult to trace. Stabilant products can be used to improve connector reliability and simplify the tracing of actual disk issues.

Issues with specific connectors

Some connectors are finished by first tin plating, then applying several sets of gold flashing for the final surface. In some cases, a connector's stock was tin plated before the mechanical forming of the contacts. Notably, some tin alloys develop areas of latent stress during forming. When such a connector is subject to thermal cycles and other stresses, the prestressed tin may flake away. These flakes are usually microscopic.

We have encountered instances where connectors passed quality control testing and were approved for shipping. The microscopic flaking process sometimes began during shipping, if cartons were used that were *not acid free*. Sulfur compounds in such cardboard stock typically accelerate the deterioration of tin surfaces.

We recommend the use of Stabilant 22 on these connectors, as it mitigates surface wear in addition to its reduction and prevention of corrosion effects.

Removal and cleaning of back plane boards

Disassembly (including static precautions and labelling all drive units, of course) is followed by cleaning all drive and connector contacts, for both data and power. This includes removal of hard drives from plug-in SCA carriers. Isopropyl alcohol is a good choice for cleaning contacts, to remove debris, grease, and moisture – it is the solvent used in Stabilant 22A. We recommend application of Stabilant 22 (the concentrate) or 22A, whichever is more convenient for each connector.

Cooling fans

Most disk drive caddies are fan cooled. Any failure of the fans can lead to premature failure of one or more drives. Connector failure is one issue that is easily prevented by treating the contacts with Stabilant 22. Note: since many fans have a speed feedback signal, this is not always a simple matter of power connection.

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

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

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