STABILANT 22

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TECHNICAL NOTE

Effects of Stabilant 22 on Signal Rise Time

Introduction

Stabilant 22 is a contact enhancer for electrical and electronic connectors and switches. It is a liquid polymer (a polyglycol) that forms a protective coating on contact surfaces and enhances the conductivity of the metal to metal contact area. It remains nonconductive except in the microscopic spaces between the contact surfaces, where an electric field gradient allows it to conduct, reducing the overall contact resistance. Stabilant 22 mitigates corrosion and wear problems by a combination of its electrical properties, surfactant action and 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.

Stabilant products include the concentrate (just Stabilant 22) and alcohol diluted products, Stabilant 22A (with isopropanol), and Stabilant 22E (with ethanol). Each is convenient for particular methods of application, as we describe later.

This Technical Note describes early tests that were done to assess the effects of Stabilant treatment of computer connectors in maintaining or improving signal rise time – a critical factor in the error-free operation of digital systems. We note that high resistance contacts (corroded or damaged) can impair digital signals. This causes delayed clock and data signals, which can push them outside of designed critical timing windows. Failures in memory operations can occur, including (at worst) bit errors (e.g., reading a ‘1’ instead of a ‘0’).

Background

In many "professional" computers the use of *socketed integrated circuits* is avoided due to the lower reliability of sockets as compared to soldered connections. I.C. sockets’ contacts have a tendency to generate noise and add extra resistance and capacitance, allowing for signal loss in the contact means, and a slower rise time on waveforms. The latter results from the higher connector resistance together with the combined external and internal capacitance of the I.C. leads (effectively and unwanted lowpass filter that distorts high speed digital signals).

Hypothesis

If the resistance in the I.C. Socket to I.C. pin contact means could be kept at a low level or lowered to that of a *new* I.C. Socket, then the rise time could be kept within the specifications necessary to maintain the effectiveness of critically timed signals.

Method

An old and unreliable S-100 type 64k memory board (DRAM I.C.'s) was set up on a connector extender in a Z-80 based computer, and measurements were made of the rise time of the chip refresh signals using a very high impedance low capacitance probe. The measurements were made:

A. On the contact where it was soldered to the circuit board (on the back of the board) and,

B. to the I.C. pin itself using needle sharp spring loaded probes so as not, in the latter case, to disturb the seating of the I.C. in its socket.

The measurements were made before and after the application of Stabilant to the I.C. contacts. The procedure was duplicated on 10 of the memory chips.

Results

Upon using the Stabilant 22 contact treatment, there was an average reduction in rise time of 40% with one contact having a reduction of 70% in its signal rise time. The board, which had hitherto been unreliable, now functioned properly once all I.C.'s were treated.

Conclusions

The tests demonstrate that in the case of Dynamic Memory I.C.'s, the reduction in rise time could well be the difference between having the I.C. perform acceptably, and failures (persistent or intermittent).

Comments

Some manufacturers may decide not to require soldered-in I.C.'s (which would have ensured reliability), as the cost of repairing boards with bad I.C.'s could be reduced by using easily replaced units. This may cut parts costs, as lower cost I.C.'s might be employed in manufacturing, under the assumption that replacement of marginal I.C.'s should be uncommon.

Stabilant treatment of socketed I.C.'s improves the economics of repairs vs. time of serviceability. One precaution should be observed, however, in application methods.

In very high speed (fast rise time) memory applications, one may encounter high pin counts with closely spaced leads. It must be remembered that the capacitance between adjacent contacts is increased by any Stabilant residue on the socket insulation.

This may be negligible, considering the reduced resistance of the contact, but this is not certain in very high speed applications. It may be necessary to remove the I.C.'s, then apply the Stabilant only to the metal contacts themselves. This can be accomplished by using a piece of thin felt (saturated with Stabilant 22A) as a multi-pin applicator.

Remember, only a very thin film of Stabilant is needed and is only *required* to be on the metal contact surfaces. We advise this care in avoiding excess in other situations:

Very high impedance circuits with low voltage and current are sensitive to leakage currents. Stabilant exposed on insulator surfaces is more prone to absorbing moisture from ambient humidity than the insulation of sockets, PCB's and conformal coatings.

In the opposite extreme, where high voltages (e.g., over 100V) are present between conductors or contacts, we likewise recommend this precaution to prevent leakage current or arcing between conductors.

NATO Identification for military procurement

CAGE (NATO Supplier Code) for D.W. Electrochemicals Ltd: 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

NOTICE

This data has been supplied for information purposes only. While to our knowledge it is accurate, users should determine the suitability of the material 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 consequent damages, howsoever caused, based on the use of this information.