

TECHNICAL INFO

DeoxIT® GOLD, Bulletin SB-G100

DeoxIT® GOLD

Maintain New System Performance™



DeoxIT® GOLD penetrates plated surfaces and prohibits dendrite corrosion from taking place by molecularly bonding to the base metal. NO OTHER PRODUCT DOES THIS. DeoxIT® GOLD increases conductivity, contact surface area and reduces arcing, RFI, wear, and abrasion (the major causes of intermittent signals, distortion and signal loss).

The unique conditioning solution improves conductivity and provides long-lasting protection on gold, base metals and other precious metal contacts and connections (gold, silver, rhodium, copper, bronze, nickel, etc.). Use on plated connectors, contacts and metal surfaces for maximum performance and protection. Recommended for critical applications where only slight cleaning action is necessary. If the surface looks clean, applying DeoxIT® contact cleaner first is usually not necessary.

Since DeoxIT® GOLD is designed to dissolve small amounts of oxidation, we recommend applying DeoxIT® GOLD after DeoxIT® contact cleaner on plated metal surfaces that have been in service. The more critical the connection or part, especially low current, indoor applications, DeoxIT® GOLD should be the final step.

Introduction

Considering the hundreds (if not thousands) of connections in electronic equipment today, it is only a matter of time before they begin to fail, primarily due to oxidation and corrosion.

Normally, we consider a connector to have failed when it interrupts or degrades signal flow. If we consider a "good" connection to be one with a reasonable amount of metal-to-metal contact, then most untreated connections are indeed substandard.

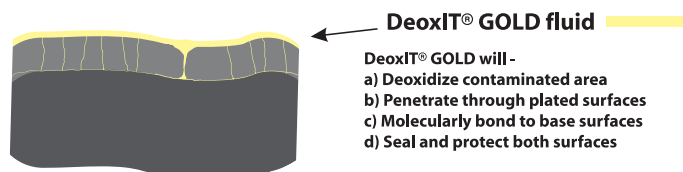


FIGURE 1.

Even if DeoxIT® GOLD is removed from outer surfaces, it has molecularly bonded to the base metals, sealing and protecting them.

Mating surfaces of connectors are typically unable to crunch through the non-conducting film of metal oxide that forms on them. Component and equipment manufacturers are aware of these problems therefore, they design a certain amount of wiping action into their switches and sockets to provide "abrasive contact."

Another popular counter-measure is to carefully select materials to fit the intended application. The problem with this approach is that exceptional contact materials (such as coin silver) deteriorate faster, while the most durable substances (such as tungsten) have poor electrical characteristics. Sometimes, a combination of materials such as gold over silver or copper is used, however, in time this combination also causes problems.

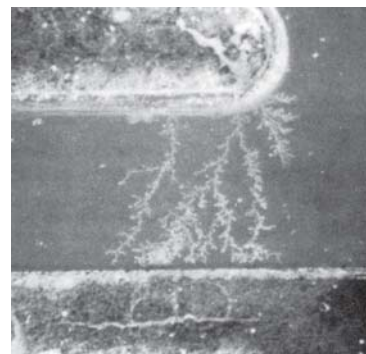


FIGURE 2. Shown - Dendrite corrosion between pads on an edge-connector.

DeoxIT® GOLD - Definition

DeoxIT® GOLD is specifically formulated to improve conductivity and provide long-lasting protection on gold, precious metals and their base metals. It penetrates connectors, contacts, and other metal surfaces and conditions these surfaces; thus enhancing the conductivity characteristics to efficiently transmit electrical signals (see FIGURE 1).

DeoxIT® GOLD can be used on all metal surfaces and is formulated to remove minor amounts of oxidation caused by wear, abrasion or dendrite corrosion. For reference, DeoxIT® GOLD has approximately 0.5% cleaning action. DeoxIT® GOLD coats





the entire contact surface and connection, providing superior protection from abrasion (insertion resistance), dendrite corrosion, arcing, RFI, wear, and atmospheric contamination.

DeoxIT® GOLD is effective on stationary and moving contacts and connectors with similar or dissimilar metals. When a treated and untreated connector mate, DeoxIT® GOLD migrates to coat both surfaces. When connectors separate, DeoxIT® GOLD recoats both exposed metal surfaces (see FIGURE 7).

DeoxIT® GOLD's unique formula contains conditioners, deoxidizers, preservatives, conductivity enhancers, arcing & RFI inhibitors and anti-tarnishing compounds. This reduces intermittent connection problems and significantly increases the quality and reliability of electrical components and equipment.

Physical & Chemical

Physical and chemical changes in surface conditions of electrical or electronic connectors are a primary cause of degraded performance in components and equipment.

When contact surfaces are exposed to dust, smoke, gases, soot, and other solids suspended in the atmosphere, non-metallic films form, inhibiting conductivity. Oxidation is the most common reaction causing metal oxide formation.

Salt-laden air in coastal areas corrodes most metals, forming chloride films. Humidity, condensation, salts, sulfur, and acid fumes are also common causes of rust, corrosion, and oxidation. Added resistance and friction between metal surfaces can also cause abrasion, noise, freeze-up, and in some cases, increased power consumption.

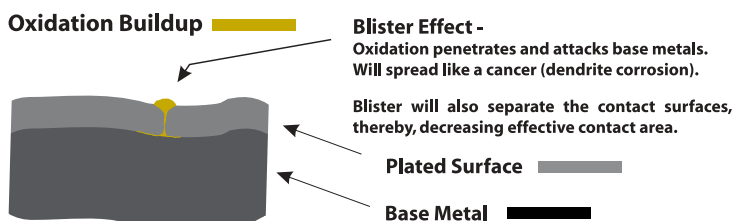


FIGURE 3.

Plated Surfaces

A common problem with plated surfaces, especially gold, is the "whiskering" (dendrite corrosion) of base metals to the surface due to gold's soft, porous nature (see FIGURE 2). Once exposed, the base metals oxidize causing a "blistering" of the surfaces, adding unwanted resistance that impedes electrical performance (see FIGURES 3 & 4). The contact surfaces are actually separated by this blister, thereby reducing the effective contact area. Since gold plated surfaces are thinly coated, they are susceptible to scratching and abrasion, further exposing the base metals.

While household users of electrical and electronic equipment may be able to cope with such problems for short periods of time, the critical nature of even minor trouble in an industrial, high-tech or aerospace application is significant.

Abrasion

Contact technology has improved with the advent of specialized alloys, bimetallic contacts and innovative plating techniques.

Whether contacts are machined or plated, it is impossible to achieve a perfectly smooth contact surface. They may appear smooth to the unaided eye, but if examined under a microscope the peaks and valleys on the surface become evident (see FIGURE 5).

When the contact surfaces are brought together, only the peaks are actually in contact with the other surface, causing increased contact resistance, higher operating temperatures, increased wear of contacts, and further exposure of base metals. This problem becomes more evident when contacts are made of dissimilar metals.

A common practice in the manufacture of contacts is to apply a thin layer of expensive gold or silver onto a cheaper base metal, usually copper. The softer metal gets worn away by the harder one and exposes the base metal. The exposed surfaces then oxidize, increasing resistance and reducing contact efficiency. In some cases this will actually separate the contact surfaces (see FIGURE 5).

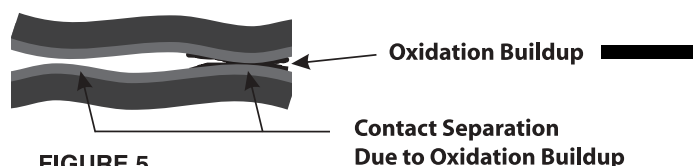


FIGURE 5.

Arcing

As contacts open and close, an arc will occur between the high and low points of the contact surfaces. This causes heat to be generated and contaminants to react with the metal contacts, creating an insulating, oxidized film. This film in turn, increases contact resistance and generates even more heat. Arcing also causes electrochemical reactions in the air between the contact surfaces resulting in nitric acid formation which can form a high resistance insulated layer.

DeoxIT® GOLD will fill the gaps in the contact surfaces increasing the effective contact area and preventing current concentration at surface peaks. The result is more evenly distributed current across the contact surfaces.

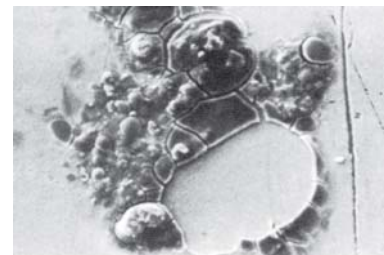


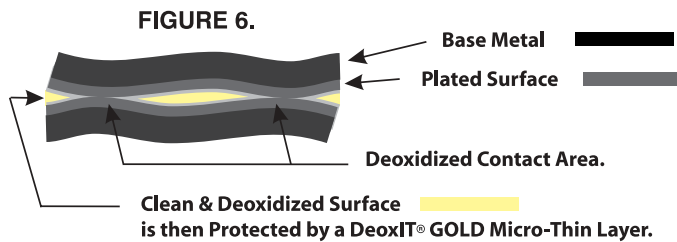
FIGURE 4. Shown - The "blistered" surface on a plated connector.



Air Contamination

Although gold plated contacts do not oxidize, they are subject to other contamination problems. Exposed metals tend to oxidize and corrode due to the contaminants in the atmosphere, resulting in a very high contact resistance. Tarnishing can also occur and is generally present on contact surfaces.

These problems are common on many plated surfaces, especially edge connectors, where the plating is generally very thin and porous, vulnerable to moisture and metal salts. The corrosion tends to separate the plated surface from the base metal. The affected surfaces are easily worn or broken away, leaving holes that invite further oxidation and corrosion. DeoxIT® GOLD forms a protective organic layer film over the entire contact surface, preventing contaminants from coming in contact with the metal. Contaminants that deposit on the surface will combine with DeoxIT® GOLD to form a thicker area of material that will be easily displaced as the contact moves. These thicker areas will be pushed away leaving a thin protective coating.



R.F. Interference, Distortion & Signal Loss

When contacts are contaminated, they can act like an antenna and become susceptible to RFI. When operated, they can cause RFI as they vibrate or chatter through the contamination. DeoxIT® GOLD eliminates the contamination and improves the integrity and conductivity of the connection preventing RFI, distortion and signal loss.

How Does DeoxIT® GOLD Actually Work?

Conduction through a DeoxIT® GOLD coated surface takes place in three ways. First, DeoxIT® GOLD can be displaced by electrical arc, shock wave or simple mechanical pressure and will redistribute itself along the surface when the disturbance is removed. Second, a thin insulating film of DeoxIT® GOLD can be dispersed by an electrical field. Finally, conduction takes place through very thin films of DeoxIT® GOLD by means of a quantum-mechanical phenomenon called "tunneling."

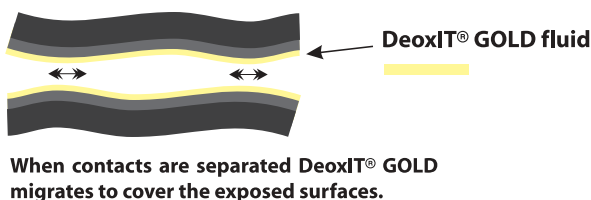


FIGURE 7.

To avoid detouring into a discussion in physics, simply stated, electrons travel from one side of a thin film of DeoxIT® GOLD to the other without passing through (this is the same effect that gave the tunnel diode its name). DeoxIT® GOLD fills the gaps in the contact surfaces, increasing the surface area and current flow (conductivity). DeoxIT® GOLD penetrates the plated surface and molecularly bonds to the base metal to seal and protect it (see FIGURE 1). Unlike other products, DeoxIT® GOLD provides long-lasting protection and will not gum-up, evaporate, varnish, char or breakdown.

Virtually Unlimited Uses for DeoxIT® GOLD

DeoxIT® GOLD is ideal for use on gold, precious metal surfaces, plated contacts and connectors, edge connectors, IC's & sockets, connectors, contacts, plugs & sockets, relays, circuit boards (for storage), stationary/moving connections, and similar/dissimilar metals. Use DeoxIT® GOLD to improve and maintain the performance & reliability of all electrical components & equipment.



FIGURE 8. Shown - Dendrite corrosion caused by excessive use of a circuit cooler.

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