Stabilant 22 Contact Enhancer Application Notes

App. Note 3 - Schadow & Equivalent Switches

Background:

Because of their modular design, ease of use, and reasonable cost, the Schadow type FE switches have found extensive use both in home and professional audio applications. However several problems with them have shown up on older equipment. The silver plating tends to tarnish in some locations, there was a potential for flux entry into some versions of the switch, and the lubricant used seemed to deteriorate in time. While newer versions have been designed and are being manufactured by ITT-Schadow, there are still thousands of the newer type in use, and thousands of the previous units in use at this time. Servicing of the switches usually involves laborious disassembly followed by cleaning of the switch housing and floating contacts on the slide assembly. The number of very small parts and springs makes this operation rather difficult when large number of switches are involved.

Other solutions that have been tried:

Dayton Wright Associates Ltd. started to use the Schadow type FE switches in the early 1970's in the production of preamplifiers. Problems with the switches led the to use such production precautions such as hand soldering of the switch to the circuit board after all other components were soldered in place, the use of flux-sealants hand-applied around the projecting PC-mount pins, as well as the substitution of other lubricants for the one supplied by the manufacturer. While all these things did increase the life of the switches, the major improvement came with the development of **Stabilant 22**. Over several years, The Dayton Wright Group Ltd., developed a procedure for treating the Schadow type FE switches without disassembly that has cut down on the amount of service work and has proven quite satisfactory in extended use. While the procedure is quite simple, for proper results all the contaminants have to be removed and only a minimal film of Stabilant 22A should be applied.

Contaminant problems:

There are two basic contaminant problems we have found with these switches. Contamination during manufacture of the circuit-board assembly, and atmospheric contamination.

Unless the switches are of the type having a sealant applied to the fixed contact (those fitted to the case body) the possibility exists for flux to wick up into the interior of the switch assembly during the soldering operation. Methods used to combat this, have ranged from adding the switch units after the other components have been wave soldered in place, to the use of solder preforms as a method of limiting the amount of flux that can be applied to each pin. Sometimes, a slight amount of tarnish on the PC contact can make soldering difficult and this, in turn, leads to an excessive use of solder (and flux).

Because the plastics used did not withstand some of the vapor-phase defluxing systems and were damaged by other solvent defluxers, some manufacturers relied on a two phase system, a somewhat less aggressive defluxers followed by a general washoff of the liquefied flux. The potential problem with the latter was that it could leave a minuscule coating of flux over all of the board's components. While this was rarely enough to cause problems on exposed wiring and card-edge connectors, the semi-enclosed interiors of the switches were more vulnerable as here the build-up was much greater.

Closed-rear push-button switches exhibit one trait in common, when they are released, they tend to "inhale" some of the atmospheric contaminants from the front-panel area, holding them inside the rear of the switch assembly where they often precipitated onto the contact assemblies. Where electronic equipment is used by smokers, there will be a gradual accumulation of tar and nicotine within the switch, in concentrations much greater than found on the other components. For the switch to function properly, both residual flux and other contaminants have to be removed along with any spent lubricants.

Cleaning out the residual contaminants:

The procedure starts with flushing out the contaminants & lubricant residue with isopropyl alcohol. We recommend the use of a 50cc syringe with a 2 inch long needle. The needle can usually be inserted at the rear of the switch between the stamped brown-phenolic wafer and the black molded body. Insert the needle so that the hole is towards the body of the switch. Working the switch, flush it out with about 10 to 20 cc's of isopropyl alcohol. Depending upon the age of the switch, this may have to be done a second time within a week to ten days as the hardened contaminants dissolve in the newly applied Stabilant film and distribute themselves on the contact surfaces. In any event all of these contaminants have to be removed for the switches to work reliably once more, and solvents that would remove all of the contaminants at the first shot could damage the plastic parts. Remember that isopropyl alcohol is flammable and work should be done in a well ventilated location.

Applying the Stabilant 22A:

Using a 1 cc disposable insulin type of syringe inject about 1/8 TO 1/6 cc (for a 2 or 4 pole) to 1/4 TO 1/3 cc (for a 6 to 1 0 pole) of Stabilant 22A into the rear of the switch. If this can be done with the switch in an approximately horizontal

position, it will minimize the loss of the **Stabilant 22A** from the front of the switch while the alcohol evaporates. Obviously, where a great number of switches are involved it is better to flush them out all at once and then proceed with the addition of the **Stabilant 22A** Immediately, upon injection of the **Stabilant 22A**, vigorously cycle the switch to distribute the material before the isopropyl alcohol evaporates. Only a very thin film is needed on the contacts. If the film is too thick, a phenomenon can occur called hydroplaning. This is where motion of the switch pushes a wave of lubricant ahead of it gradually thickening the film and widening the gap. This could delay the switch on of the contact when instantaneous operation is needed. Generally, hydroplaning should be suspect when it is the switches that are most often used that cause problems, rather than the least used switches. The slight detergency action of the **Stabilant** will lift much of the existing tarnish over a period of time, holding it in solution. Normally this does not degrade the operation of the switch. Some use prefer to repeat the procedure six to twelve months later to remove the suspended tarnish.

Precautions and re-applications:

As noted, on equipment that has been in service some time, the detergency action of the Stabilants may well loosen up so much detrius, and even residual flux inside the switch that it might be necessary to re-flush-out the switch and re-apply the **Stabilants**. The need for this will be shown up if the treated switch becomes noisy once again within two to three weeks. Remember, a# traces of the existing grease MUST have been removed as well!

Results obtained:

Measurements on treated switches have shown a marked improvement of the signal-to-noise ratio on signals, as well as a significant reduction in total harmonic distortion. As an example, although the material has been used on preamplifier switches. since the early 1980's no repeat lubrication has proven necessary for units treated in that time indicating a useful life in excess of five years..

CAUTION: A virtual copy of the ITT-Schadow switch is being manufactured by TONELUCK(TM) and is now being used by Sony both in new equipment and as replacements. The sealant used on these switches does not appear to meet the usual standards for conformal coatings and may be damaged by many of the solvents used in electronic service. We would strongly advise against using any cleaner or contact treatment on these switches. They can be distinguished by the name TONELUCK underneath the switch, their gray body and clear plastic (rather than phenolic) top plate.

Revision 7

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

MATERIAL SAFETY DATA SHEETS ARE AVAILABLE ON REQUEST
