TRANE™

General Service Bulletin

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Literature Changes:

Added clarification that this bulletin only applies to "Version 1" and "Version 2" of the Cutler-Hammer SSOL.

Subject: CUTLER-HAMMER SOLID-STATE OVERLOAD (SSOL) UPGRADE

Introduction:

This service bulletin outlines several recommended changes and additions to "Version 1" and "Version 2" of the Cutler-Hammer solid-state overload ("SSOL"; Trane part no. RLY-765). Built from 1981 through December 1986, the affected SSOLs were used in CVHE, CVHB, CVAC and MSPS retrofit kit applications.

Note: By March 1st, 1987, 4 different versions of the Cutler-Hammer SSOL (electrically designated as "A1") will be available in the field. However, **only "Version 1" and "Version 2" are affected by the upgrade described in this bulletin since these improvements are completed by the factory on "Version 3" and "Version 4" of the SSOL!** To distinguish one version of the SSOL from another, look for the following identifying characteristics:

a. "Version 1". The original—and most familiar—version of the Cutler-Hammer SSOL was introduced in 1981 and manufactured until September 1986.

b. "Version 2". Built from September 1986 through December 1986, this variation of the SSOL is most readily identified by the "REV A" that appears on the front cover of the module. It can also be distinguished from Version 1 by comparing the p.c. board assemblies: Version 2 does not include the 50/60-Hz frequency adjustment switch, and all of the IC chips are soldered into place.

c. "Version 3". Identified by a "REV B" on the module's front cover, this SSOL variation is scheduled for production from January 1987 until March 1987, and includes these modifications: removal of the locked rotor potentiometer; a different transformer; removal of the J1-J2 jumper; and factory installation of the "new style" transition relay, MOV, capacitor and surge suppressor described in this bulletin.

d. "Version 4." Scheduled for initial production in March 1987, Version 4 of the SSOL will be known as the "AG-5". In addition to all of the modifications described for Version 3, the AG-5 includes a redesigned p.c. board. You will also notice that the terminal strip and acceleration time DIP switches are relocated to the outside of the SSOL module.

Discussion:

Testing and evaluation of "Versions 1 and 2" of the Cutler-Hammer solid-state overload module revealed areas where improvements can be made to increase reliability. The following sections discuss each of these areas in detail.

1. Intermittent Transition

The plug-in style transition relay originally provided in the overload module was an American Zettler Model AZ420-70-4HUS, while an AMF Potter-Brumfield Model R10-E1-X2 replacement relay was used for La Crosse service stock. Both of these relays have contacts made from a cadmium-oxide/silver-type material.

Cycle testing has shown that intermittent closures occasionally occur as a result of cadmium build-up between the surfaces of the relay contacts. A material specification change was made that requires the use of all-silver contacts in the transition relay.

2. Nuisance Tripping Due to Current Imbalance

The SSOL module senses the 3 current phases of the motor and converts them to a proportional DC voltage output at Terminals V1-V2. The resulting VDC signal is then used by the capacity control module to current-limit the chiller. When a significant amount of current imbalance exists in the system, the Cutler-Hammer SSOL may trip on the highest of the 3 current legs while the capacity control module is trying to current-limit based on the average. This type of nuisance trip only occurs when the unit's running load current is near 100%.

Installation of a capacitor wired in parallel with the current calibrator (Terminals B1-B2) in the SSOL will eliminate these nuisance trips.

3. Electrical Component Failures Due to Voltage Transients

High voltage spikes in the 120 VAC control circuit can cause SSOL module failure. This particular problem was discussed in Service Bulletin CVHE-SB-12A, which recommended field installation of a surge suppression device (metal oxide varistor, or "MOV") in the control circuit to protect the 120 VAC input portion of the overload module.

Further inspection of failed overload modules also verified that voltage transients can be introduced into the low voltage circuit (V1-V2) and cause the failure of operational amplifier Z1. This type of failure is usually the result of improper wiring in the V1-V2 circuit between the SSOL in the starter panel and the capacity control module in the chiller control panel. Remember that interconnecting wiring for V1-V2 must be 18 AWG, shielded wire. When properly installed, the shielding is only grounded at the starter panel.

Caution: Voltage from external sources may be induced into the V1-V2 circuit and damage the SSOL module if the wiring is improperly grounded.

Transient voltage suppression can be obtained with the addition of a bipolar surge suppressor---or "TRANS ZORB"---across the SSOL's V1-V2 terminals. The addition of this device is not only recommended for all installations without proper shielding, but can also be added to any installation with shielded wire for increased voltage-transient protection.

Note: Shielded cable was not used in some Trane-built, unit-mounted starters manufactured between January 1985 and January 1986. Be sure to review all succeeding installations of Model CVHE and CVHB units with free-standing starters to verify that the V1-V2 wiring conforms to the specifications outlined in this bulletin.

4. Electrostatic Discharge (ESD)

Because of the "metal oxide semiconductor" (MOS) component technology used in the construction of the SSOL module, the electronic components on the p.c. board are susceptible to damage caused by electrostatic—or "static" —discharge. Static discharges are most often transmitted by a person touching the SSOL's electronic components or the p.c. board itself.

To prevent electrostatic discharges, always wear static control wrist straps (i.e., 3M Model 2071 wrist straps, or equivalent) whenever working inside the overload module.

Corrective Action:

When service is required on a unit with "Version 1" or "Version 2" of a Cutler-Hammer SSOL, be sure to complete the modifications described below.

1. Intermittent Transition. Install a new transition relay (RLY-849) in place of the existing relay.

After February 1st, 1986, all relays ordered from La Crosse service stock are the new style. The model number of the new-style transition relay is R10-E1-Y2 (Potter-Brumfield). ("Y2" indicates that the relay contact material is all silver, rather than cadmium-oxide/silver.) Be sure to check your office stock of RLY-849 to ensure that all relays are the new style.

2. Nuisance Tripping Due to Current Imbalance. Install an electrolytic capacitor (22 to 26 MFD, rated for 25 to 100 VDC) across SSOL Terminals B1-B2; Trane part no. CPT-335 is recommended for this application.

Wire this capacitor in parallel with the existing current calibrator in the SSOL module. Since CPT-335 is nonpolarized, it can be installed without regard to the polarity of Terminals B1-B2. However, if a locally-supplied capacitor is used, be sure to install it so that the positive (+) side is on Terminal B1 and the negative (-) side is on Terminal B2.

3. Electrical Component Failures Due to Voltage Transients. Install a metal oxide varistor—Trane part no. SPS-11—in the unit control panel if one is not already there; refer to Service Bulletin CVHE-SB-12A for installation details.

Then, wire a "TRANS ZORB"—Trane part no. SPS-14—between SSOL Terminals V1-V2 to protect the Z1 output operational amplifier in the low voltage circuit.

4. Electrostatic Discharge. Whenever the cover of the SSOL module is removed for service, static discharge must be avoided! Wear static-control wrist straps to eliminate any possibility of electrostatic discharge.

For further information on this product or other Trane products, refer to the "Trane Service Literature Catalog", ordering number IDX-IOM-1. This catalog contains listings and prices for all service literature sold by Trane. The catalog may be ordered by sending a $20.00 check to: The Trane Company, Service Literature Sales, 3600 Pammel Creek Road, La Crosse, WI 54601.

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