

83-807-000



Brown Boveri Electric, Inc.

Manufacturer of I-T-E Electrical Power Equipment

April 27, 1983

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Mr. Victor Stello, Jr., Director
Office Inspection & Enforcement
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Type SA-1 Class 1E Relays

Dear Mr. Stello:

Westinghouse, Relay & Instrument Division, located in Coral Springs, Florida has identified to Brown Boveri Electric, a potential problem with the Type SA-1 Class 1E relays used in Nuclear Safety Related Switchgear applications.

The report indicates that a silicon controlled rectifier (SCR) in the trip output circuit may, under certain conditions, cause a random trip output. The SCR manufactured by S. T. Semicon Inc. has been used by Westinghouse in the manufacture of Type SA-1 relays since January 10, 1980. S. T. Semicon Inc. is located at 415 N. College Avenue, Bloomington, Indiana 47401. Westinghouse has advised us that they are still in the process of completing their evaluation of this matter and have not yet decided upon final corrective action. Westinghouse has proposed an interim corrective action which is to replace the existing SCR with a "burned-in" SCR. This interim corrective action can be accomplished in the field. Westinghouse has indicated that the SCR may be replaced without affecting calibration of the relay. If field replacement is decided upon, it is recommended that the "adjustments and maintenance and electrical checkpoints" sections of (Westinghouse) I.L. 41-348-11 "Type SA-1 Generator Differential Relay for Class 1E Applications" be followed.

These relays are normally used to protect Class 1E diesel generators and a false trip would cause a shutdown of the diesel engine and generator.

Brown Boveri Electric records indicate that Type SA-1 relays with the potentially defective SCR have been utilized in switchgear delivered to the following users:

Duke Power/Oconee *Operating plant*
Gulf States Utilities/River Bend Project
Public Service Indiana/Marble Hill Nuclear Generating Station

Michelle
① Make a copy for Nat.
② Enter into P.21 system & assign to Nat.
Bill

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PDR ADDCK 05000269
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Although the Type SA-1 relays have been delivered in switchgear to other Nuclear Generating Stations, the potentially defective SA-1 relays have been delivered only to the three stations mentioned above. The other SA-1 relays have SCR's manufactured differently, and apparently do not have this potential deficiency.

Brown Boveri Electric will notify the three users identified above with the potentially defective SA-1 relays through our District Sales Offices.

A copy of the Westinghouse Electric Corporation letter of April 13, 1983, advising Brown Boveri Electric of this potential problem, is included as an enclosure to this letter for your reference.



D. D. DUVAL
Vice President

EWR/jm

Enclosure

cc: C. E. Kunkel
W. E. Laubach
J. F. McCormick
F. E. Novak
E. W. Rhoads



Westinghouse
Electric Corporation

One Bala Cynwyd Plaza
Bala Cynwyd Pennsylvania 19004
(215) 667 7600

April 13, 1963

Brown Boveri Electric
4371 County Line Rd.
Chalfont, Pa. 18914

Attention: Mr. Gerald F. Jackson,
Buyer


Type SA-1 Class 1E Relays

Dear Gerry:

We have had reports from the field that commercial relays have provided trip outputs when there have been no system conditions warranting an output. The trip output has been attributed to the random "firing" (turning on - becoming conductive with no gate input) of a silicon controlled rectifier in the trip output circuit. There have been no reports of this happening in SA-1 relays, commercial or Class 1E, but the SA-1 utilizes the same SCR in a similar trip circuit.

Q.A. and Engineering have been investigating these reports. Eighteen devices returned from the field and over 150 devices from inhouse inventory have been tested. The following comments and conclusions are based on what we have learned to date.

1. Certain SCR's can provide a random trip output.
2. The phenomena appears to be isolated to the devices purchased from a single manufacturer, ST Semicon. We first started to purchase these devices on January 10, 1980.
3. The tendency to provide a random trip is dependent upon the history of ambient temperature, voltage and time. The higher any of these parameters, the more likely an ST Semicon SCR will provide a random trip.
4. ST Semicon has recommended "burning-in" as the technique for "weeding out" devices that may exhibit this tendency. "Burning-in" consists of placing an SCR in an 80 degree C ambient for 48 hours with 500VDC applied, anode to cathode. Devices which go through this process without becoming conductive are believed to be good devices.
5. Our investigation is continuing and we have not, at this time, decided on a corrective action.

Please review the SA-1 relays below. Any relays containing SCR's that were manufactured by Westinghouse (identified by a (W) logo and 2N1850 printed on the barrel) or SNYTRON (identified by a FMC logo and 184A614) are not believed to be subject to this phenomena. SCR's manufactured by ST Semicon (identified by a  logo and CR127) are suspect. Aside from the "burn-in" of item 4 above, we do not have any method of determining which particular ST Semicon SCR's will exhibit this tendency.

<u>Serial No.</u>	<u>(W) G.O. Number & Item</u>	<u>Customer Order Number</u>
4772	PH68333-N1-H1	J96608-53566
5768A	PH69899-N1-D	J52531-53170
6912	: PH61036-N1-C	J57018-51128
7808	PH61316-N1-I	J66315-51128

Since we have not completed our investigation and do not have a final solution at this time, we would like to postpone making any revisions to SA-1 relays in the field. The purpose for sending this letter is to alert you to the situation and propose interim actions if you have SA-1 relays applied where the potential for a random trip, as evidenced by the presence of an ST Semicon SCR in the relay, should be removed..

Our proposed interim action is to replace the existing SCR with a "burned-in" SCR. This may be accomplished by returning the relay to us as an RMR. We will replace the SCR with a "burned-in" device, recalibrate, re-inspect and test in Q.A. and provide new certification. We can also supply "burned-in" SCR's for field replacement. Engineering has indicated that the SCR may be replaced without affecting the calibration of the relay. If field replacement is decided upon, we recommend that the "Adjustments and Maintenance" and Electrical Checkpoints" sections of I.L. 41-348-11 "Type SA-1 Generator Differential Relay for Class 1E Applications" be followed. If field replacement is accomplished, we request that a memo so stating be sent to me so our Class 1E records for each serialized relay can be kept up-to-date.

Since we have not decided upon a final corrective action, the above may turn out to be an interim action to reduce the probability of a random trip output being produced by a SA-1 relay. It may be necessary at a later date to recall relays modified as proposed above, to further modify them in line with our final corrective action. This would only be necessary if we believe that "burn-in" is not as effective as our final corrective action.

We do not have application information or knowledge necessary to perform an evaluation to determine if the potential for random trips from Class 1E SA-1 relays with ST Semicon SCR's as described above, could create a substantial safety hazard in your application of these relays.

If you have the required application information or knowledge, you should determine if this potential is creating a substantial safety hazard in the Class 1E application of these relays. If you determine that a safety hazard exists you should take appropriate reporting action as required by NRC Regulation 10CFR Part 21, "Reporting of Defects and Non-Compliance". One of the purposes of this letter is to initiate a chain of reporting that will continue until the person(s) who is able to make this determination is informed of the potential for random trip output.

If relays are to be returned ~~to~~ "burned-in" SCR's are to be supplied; arrangements should be made through:

Dodge Taboga/Bob Celotto
Westinghouse Electric Corp.
One Bala Plaza
Bala Cynwyd, Pa. 19004

If it is determined that the relay (S) in any case should be modified, it (they) should be returned to our regular RMR procedure by contacting us as above.

You of course recognize the importance and exigency of reviewing the particular relay applications noted above. Your immediate cooperation on this would be greatly appreciated.

Very truly yours,

D. A. Taboga

D. A. Taboga
Phila Industrial Sales

DAT:sa