



November 20, 2002

Document Control Desk
US Nuclear Regulatory Commission
Washington, D.C. 20555

SUBJECT: Power Shield Tap Block Solder Joints
10CFR Part 21 Report

NOTIFICATION BY: ABB Inc.
Allentown site
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Quality Assurance

On June 25, 2002 the Virgil C. Summer Nuclear Station reported that they found broken solder joints (crack in solder joint) on some pins on the tap blocks of ABB Inc.'s Power Shield trip devices in the 30000 serial number range. Two Power Shield printed circuit assemblies were sent to ABB Inc. for review. The cracked solder connections look similar to the cracked solder connections found on the connectors reported via Part 21 on November 20th, 1995. The most likely cause of the cracked solder joints is from normal mechanical stress on the tap block pins.

ABB Inc. reviewed our records concerning Power Shield returns and found that 21 Power Shields (.002% of our shipments) were returned since 1995 due to cracked solder joints on tap block pins on either the Long Time / Inst. Board or Short Time / Ground board. These are the only two boards where the tap blocks are located. None of the returns were for 1E safety related applications. The serial numbers of the 21 Power Shields returned due to broken solder connections on tap blocks ranged from 22523 to 75095.

All of the returns with broken solder joints were manufactured using single-sided printed circuit boards. Power Shields manufactured after serial number 80,000 (year 1990) contain a technical improvement, namely double sided solder pads and plated through printed circuit board holes which increases the mechanical strength of the solder joints. This improved design prevents deflection and fatigue failure of the solder connection. There is no likelihood of similar failures at tap block pins in the new printed circuit board design.

There are two options for resolving the reported defect in Power Shield trip devices with serial numbers below 80,000. Option one is to inspect and if necessary, repair Power Shields per attachment A of the attached 10CFR Part 21 report. This assures a reliable present condition and is considered an effective repair measure.

ABB Inc.

JEI 9

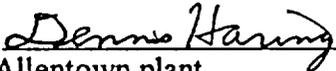


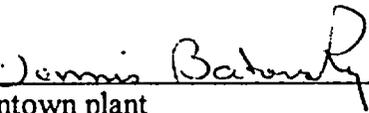
Option two is to replace the Power Shield trip device. This is considered a permanent solution.

Periodic re-inspection of inspected/repared Power Shields is advisable. The long elapsed period (20 years) before the problem was detected and the small number of known failures suggests that the frequency of re-inspection could be every breaker service interval. Per ABB MS 3.1.1.9-2D, page 5, this recommended interval is a maximum of 5 years or the following accumulated number of operations, whichever comes first:

K-600/800	1750 operations
K-1600	500 operations
K-3000/4000	250 operations

If you have any questions regarding this notice, please contact the ABB Inc. Customer Support department at 800-634-6005, 610-395-7333, or fax 610-395-1055.

Prepared by Dennis Haring 
QA Supervisor, ABB Inc., Allentown plant

Reviewed by Dennis Batovsky 
Quality Manager, ABB Inc., Allentown plant

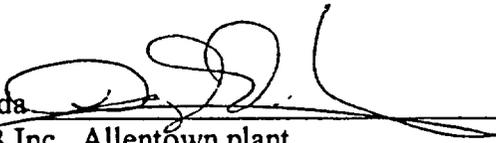
Reviewed by Doug Voda 
General Manager, ABB Inc., Allentown plant

ABB Inc.

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Photo #1

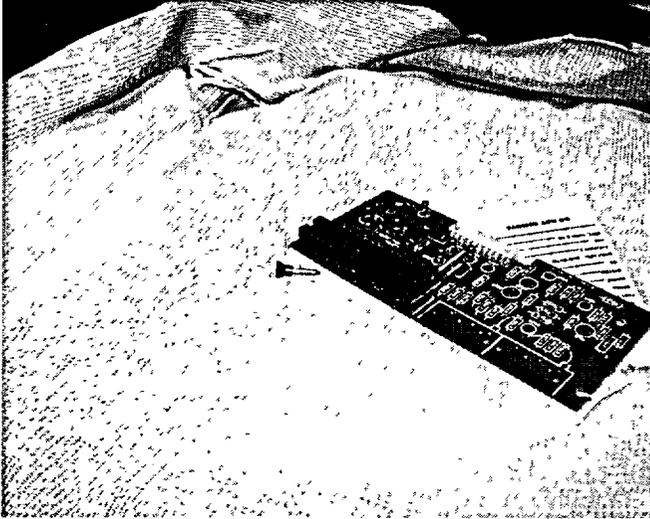


Photo #1 shows a Short Time board with the red tap blocks and a tap block pin removed.

Photo #2

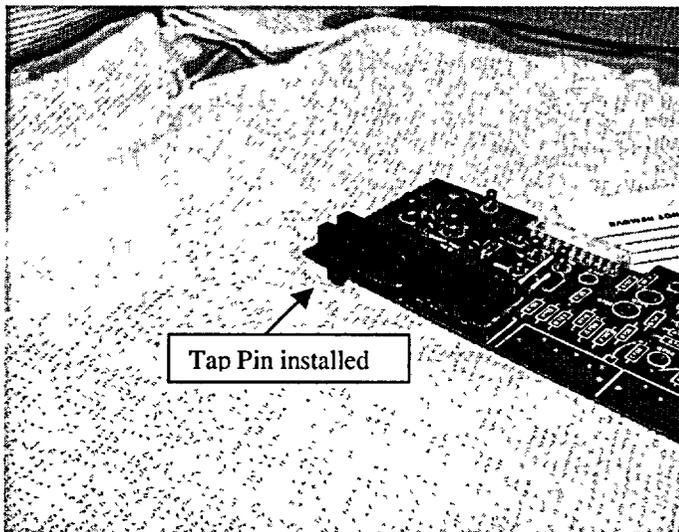


Photo #2 shows a Short Time board with red tap blocks and a tap block pin inserted.

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Photo #3

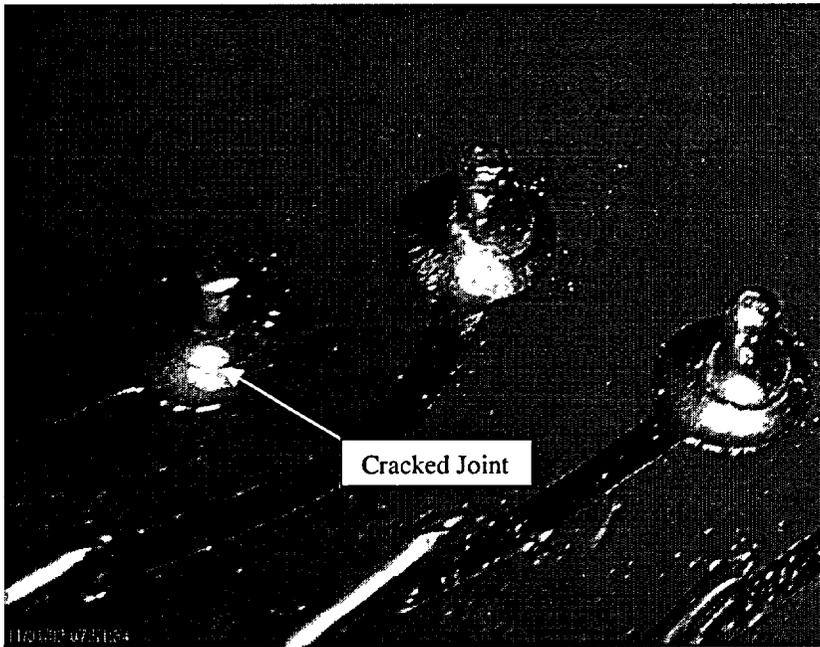


Photo #3 shows cracked solder connections on three tap block pins (underneath tap block).

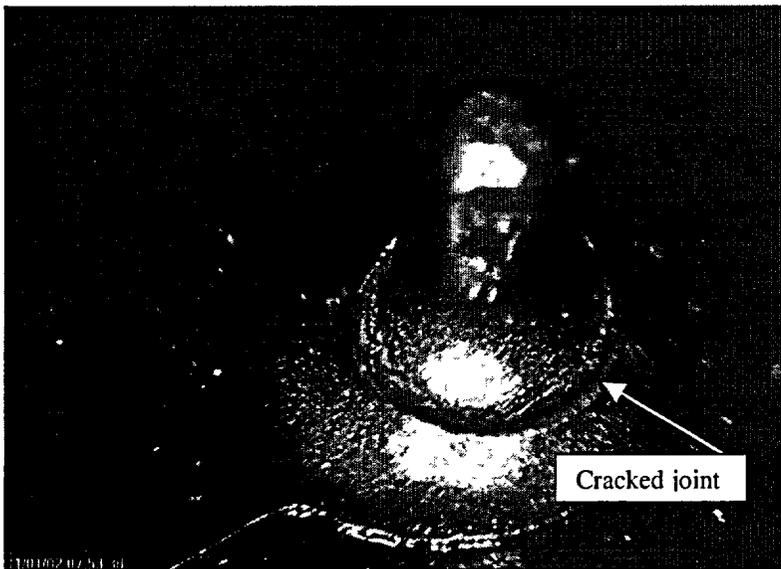


Photo #4

Photo #4 shows a tap block pin solder joint with a 360 degree crack.

Attachment A

Before disassembly, the unit must be de-energized and removed from the circuit breaker.

Disassembly:

1. Remove the four (4) screws on the plexiglass cover. Remove cover.
2. Record the tap pin settings for each function so the unit can be reset after rework is complete. Remove tap pins after recording settings.
3. Remove terminal screws #3 and #16. Detach external resistor wires.
4. Remove the two (2) shoulder screws at the top of the front panel and the two (2) screws at the bottom of the panel. Remove the front panel. Carefully remove the two (2) round spacers located on the face of the mounting blocks on each side of the terminal block. Note: at times, spacers stick to the underside of the front panel.
5. Remove two (2) screws, one from the face of each mounting block. Remove the circuit card assembly from the gray case.
6. Remove the four mounting screws from the top printed circuit board (Short Time and Ground printed circuit board, if the unit is equipped with these functions). Remove board.
7. Remove the four (4) shoulder screws from the next printed circuit board (Long Time and Inst. printed circuit board). Remove board.

Inspection:

1. Inspect the solder connections on the tap block pins on the Short-Time / Ground And Long-Time / Inst printed circuit assemblies. Martin Marietta, IPC 610-A-610 Class 3 or the photographs provided by ABB should be used when inspecting these solder connections. All cracked or defective solder connections found, should be repaired by qualified personnel familiar with electronic circuit board repair. ABB Inc. recommends the following method be used:
 - 1a. The defective solder connection must be completely desoldered by using a good quality desoldering tool or solder wick. Care must be used when desoldering the joint as excessive heat will cause the printed circuit pad to

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lift off the board. A tap pin should be inserted in the tap block for the associated connection where solder is to be removed.

- 1b. All flux residue and poly spray must be removed from the connection area. ABB Inc. recommends that Micro Care MCC Pro Clean or a suitable substitute be used.
- 1c. A tap pin **must** be connected in to the associated tap block position when resoldering the connection. A 60/40 rosin core solder should be used. The soldering iron temperature should be 700 to 800 degrees Fahrenheit. Upon completion, the soldered connection should be cleaned of all flux residue. Personnel resoldering connections should have electronic repair and soldering skills and follow established ESD practices.

Reassembly:

1. Upon completion of the inspection, repair and cleaning of the solder connections, Proceed with the assembly in reverse order of steps 1 to 7.
2. Hardware should be torqued 9 to 10 inch pounds. All required lockwashers should be fully compressed.

Upon completion of the reassembly, the unit **must** be tested per Instruction bulletin IB number 6.1.2.7-4 before being returned to service.

Should you desire this process be performed by ABB Inc., please contact the Customer Support department at 800-634-6005, 610-395-7333, or fax 610-395-1055.