



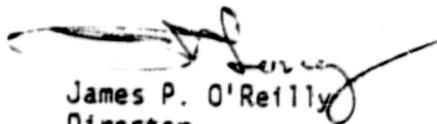
UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
101 MARIETTA ST., N.W., SUITE 3100  
ATLANTA, GEORGIA 30303



Gentlemen:

The enclosed circular is forwarded for your information. No written response to this circular is required. If you have any questions related to this matter, please contact this office.

Sincerely,

  
James P. O'Reilly  
Director

Enclosures:

1. IE Circular No. 81-06
2. List of Recently Issued  
IE Circulars

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF INSPECTION AND ENFORCEMENT  
WASHINGTON, D.C. 20555

April 14, 1981

IE Circular 81-06: POTENTIAL DEFICIENCY AFFECTING CERTAIN FOXBORO 10 to 50  
MILLIAMPERE TRANSMITTERS

Description of Circumstances:

NRC has been recently advised of two deficiencies in certain E-10 Series Foxboro transmitters which could adversely affect their operation during accident conditions. The deficiencies involve the improper use of Teflon wire insulation and an unsuitable capacitor in the amplifier section of these transmitters. The transmitters in question have been identified as Foxboro Models N-E11, N-E13, and E-11, E-13 with suffix Codes /MCA, /MCA/RRW, and /MCA/RR. These transmitters operate at an output signal level of 10 to 50 milliamperes (mA). Similar model number units operating in the range of 4 to 20 mA are not a concern in these matters.

Briefly, the information on the deficiencies was brought to the attention of the NRC Staff during a recent meeting with several licensees of a "Utility Transmitter Qualification (UTQ) Group." This group has been formed to develop and implement an acceptable environmental qualification test program for safety-related electrical equipment in use or planned for use in nuclear power plants.

According to Foxboro, the Teflon insulation material in question has demonstrated a tendency to embrittle and deteriorate when subjected to an integrated radiation dose of 200 megarads. A total integrated dose (TID) of 200 megarads was called for in the qualification test sponsored by the UTQ Group that led to the discovery of the Teflon insulation and capacitor problems.

With respect to the capacitor problem, the manufacturer determined that the capacitor was not hermetically sealed as specified. Unsealed capacitors can leak and malfunction under adverse conditions, especially those of heat and time. Foxboro determined that the capacitor failed after being subjected to high temperatures resulting from gamma heating during the above-mentioned qualification test.

Subsequent to the investigation into the discussed problems, Foxboro issued a technical letter dated March 12, 1981 to all licensees, NSSS vendors, architect-engineers, and others who have purchased the Foxboro 10 to 50 mA transmitters in question. This technical letter further describes the Teflon and capacitor deficiencies and provides recommendations to identify and correct the problems. Foxboro has also provided a copy of master instruction (MI) booklet, MI-20-145, dated September 1976, on the Foxboro 10 to 50 mA transmitters, to recipients of the technical letter. The MI document has been specifically marked on pages 5 and 6 to identify the parts of the amplifier in question.

Enclosed are copies of the technical letter and the master instruction document for your use and appropriate action.

For holders of Licenses of operating facilities including NTOL and SEP plants, it should be noted that reporting requirements are specified in the NRR/GL safety evaluation report (SER) relating to environmental qualification of safety related electrical equipment. These instructions, "We request that you provide --- within 90 days," are stated in both the SER and the transmittal letter to each utility.

Recommended Actions to be Taken by All Nuclear Power Facilities Holding an Operating License or a Construction Permit:

1. Determine if your facility has installed or plans to install Foxboro 10 to 50 mA transmitters that have model numbers the same as those identified above in safety-related systems located in areas subject to a harsh environment, including those areas where long-term LOCA coolant piping is routed.
2. Where Foxboro 10 to 50 mA transmitters are identified, it is recommended that you replace the suspect amplifiers in accordance with the recommendations and instructions provided in the enclosed letter and instruction manual. However, if it is determined that a transmitter is installed in an area where the TID is less than 10 megarads, the licensee should assure that the affected transmitter will function as intended under the expected TID resulting from the postulated accident conditions.
3. We remind you that the equipment qualification SER identified above requires that licensees of operating facilities (including NTOL and SEP plants) develop plans and programs including schedules for corrective action and the basis supporting continued operation regarding items 1 and 2 above. This information should be incorporated in your submittal to the SER on equipment qualification.
4. For Holders of Construction Permits, resolution of these matters should be available for review through normal follow-up inspections by the NRC Regional Offices. This information will also be considered during the operating license review.

No written response to this circular is required. If you need additional information with regard to this subject, please contact the Director of the appropriate NRC Regional Office.

Attachments:

1. Foxboro Technical Letter  
dated March 12, 1981
2. Foxboro Master Instruction  
MI 20-145 dated September 1976
3. Recently issued IE Circulars

Foxboro, MA 02035 U.S.A.  
(617) 543-6780

## The Foxboro Company

12 March 1981

**Subject:** Potential Deficiency Affecting Foxboro Transmitters,  
Model Numbers N-E11, N-E13 or E11, E13 with suffix  
Codes /MCA, /MCA/RBW, or /MCA/RE

Gentlemen:

Our records indicate that you have received one or more of the Foxboro model numbered transmitters listed above. This letter is to notify you that two deficiencies have been discovered in some of these transmitters which may exist in the units shipped to you. The transmitters in question operate at a signal level of 10-50mA. Similar model numbered units operating at 4-20mA are not affected.

The first issue involves the possible use of incorrect insulating sleeving on transistor and zener diode lead wires in the amplifier. The second issue involves the use of a specific vendor's capacitor which is not hermetically sealed (although claimed to be so). As a result, the capacitor electrolyte can leak under adverse service conditions, specifically heat and time. The failure mode is a decrease in resistance across the capacitor resulting in electrical leakage. The transmitter operation can be affected by limiting the output to something less than full value which, in time, can degrade to no output at all.

Insulating Sleeving - Radiation resistant sleeving consisting of a silicone coated glass fiber braid has been substituted by a teflon sleeving in some transmitters. Tests have shown that teflon will become brittle and deteriorate with a substantial integrated radiation dose. Foxboro testing has demonstrated that the teflon sleeving used in these devices will withstand an integrated dose of 10 megarads with no noticeable deterioration. Tests to 200 megarads produce the brittle conditions which can result in the teflon flaking from the wires. Based on these tests, operating plants not expected to exceed an integrated dose of 10 megarads have no potential problem and no action is required.

Where the integrated dose rate could exceed 10 megarads, then units in service should be inspected to determine if the proper insulating material has been used. This can be accomplished by opening the transmitter in accordance with Foxboro Master Instruction MI 20-145. The amplifier cover must be removed exposing the amplifier assembly. At one end of the assembly, a transistor and a zener diode are mounted in the base casting which serves as a heat sink. The insulating material in question is a sleeving slipped over the lead wires from these two components. The proper material is white and heavy looking. Positive

**FOXBORO**

Pa. 2  
11 March 1981

Subject:

identification can be made by inspecting one end of the material to establish that the outer material covers an inner braid. Teflon, if used, will be a single layer material and could be either clear or white.

If improper insulation is present, then the corrective action is to replace the amplifier (Foxboro P/N N0148PW). Replacement amplifiers can be purchased from your local Foxboro Sales or Service Representatives. If you prefer to have Foxboro Service Personnel inspect the equipment and, if necessary, replace the amplifier, this can be arranged at standard service rates.

Capacitor - The capacitor degradation problem was discovered over time through tracking failure situations. Internal corrective action has been taken to remove the vendor involved from the qualified vendor list and to purge all stock of capacitors from this vendor. Degradation of this capacitor is a function of time and service conditions with heat being a primary contributor. This phenomenon was observed in recent tests of transmitters using these capacitors. The capacitor in question is manufactured by Cornell-Duebiller and can be specifically identified by a type number in the form TX-65-XXXX as well as a monogram in a box followed by a date code, e.g. CDE 0874. It is assigned Foxboro part number N0141MF.

To determine if this capacitor is present requires a visual inspection of the amplifier which can be accomplished as described above for the insulating sleeving inspection. The recommended corrective action should the above described capacitor be present is to replace the amplifier (Foxboro P/N N0148PW) although it is possible to replace the capacitor with a Foxboro provided substitute. Use of Foxboro Service personnel to perform the inspection and replacement, if necessary, can be arranged at standard service rates as described above.

Due to lack of knowledge of specific application, redundancy, and the like, Foxboro cannot determine if the NRC reporting requirements of 10CFR Part 21 are applicable. This determination is the responsibility of the user and any such reporting would be made by them after completing their evaluation of the situation.

If you have any questions regarding the above, please contact the undersigned directly.

Very truly yours,

THE FOXBORO COMPANY

  
William Calder, Manager  
Corporate Quality Assurance

Joy  
120381

Enclosure MI 20-143

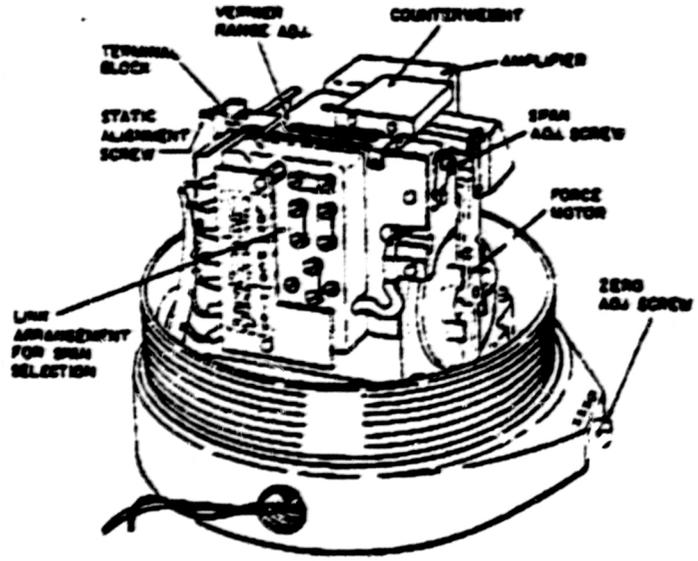
**FOXBORO**

# Instruction

MI  
20-145  
September 1976

-- ELECTRONIC SERVICING --  
Series E10 Force-Balance Transmitters  
(10 to 50 mA Signal)

The Series E10 Electronic Force-Balance Transmitter top-works shown at right is used with various types of transmitters. The body (not shown) varies according to the type of application involved. The electrical wiring is the same for all transmitter top-works.



Wiring - Integral Amplifier

