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Date: August 15, 2016

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Part 21 Report No: P21-04302015, Rev. 3

Subject: **Update** - Report of potential 10CFR Part 21, Allen Bradley Timing Relay Model 700RTC – NRC Event Number 51030, Accession Number ML15134A016

Revision 2, corrections:

1. Page 5 (vii), 2nd paragraph: changed EPRI TR-102323 Rev. 3 to Rev. 4.
2. Page 5 (vii), 3rd paragraph: changed 'timing' contacts to 'instantaneous' contacts.

Revision 3 correction: The date the change occurred is October 2008.

Pursuant to 10CFR 21.21 (d) (3) (ii), AZZ|NLI is providing written notification of the identification of a potential failure to comply.

On the basis of our evaluation, it is determined that AZZ|NLI does not have sufficient information to determine if the subject condition would, or has, created a Substantial Safety Hazard or would have created a Technical Specification Safety Limit violation as it relates to the subject plant applications.

The following information is required per 10CFR 21.21 (d) (4).

(i) Name and address of the individual or individuals informing the Commission.

Tracy Bolt, Director of Quality Assurance
Nuclear Logistics, Inc
7410 Pebble Drive
Ft. Worth, TX 76118

(ii) Identification of the facility, activity, or the basic component supplied for such facility or such activity within the United States which fails to comply or contains a defect.

The specific part which fails to comply or contains a defect:

As of October 2008, Allen Bradley relays base model 700RTC, contain a CPLD (Complex Programmable Logic Device). This was an unpublished design change that was implemented to replace an obsolete integrated circuit chip. The undocumented design change did not result in a part number change from Allen-Bradley. There was no change to the appearance of the relay that would identify any design changes were made to the relay configuration.

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NUCLEAR LOGISTICS INC.
www.azz.com
7410 Pebble Drive • Fort Worth, Texas 76118 • 800.448.4124 Phone • 817.590.0484 Fax

The timing relay model 700RTC has been dedicated/qualified for multiple applications for various plants.

(iii) Identification of the firm constructing or supplying the basic component which fails to comply or contains a defect.

NLI procured the commercial grade relays, dedicated, qualified and supplied the subject relays as Safety Related.

(iv) Nature of defect or failure to comply and the safety hazard which is created or could be created by such defect or failure to comply.

In October 2008, Allen Bradley made a design change without changing the part number of the commercial relay or providing any documented evidence of a design change. The manufacturer specification data sheets maintain the classification that the relays are "solid state", which would imply that there are no digital devices installed in the relay. However, after inspection of the internals of the timing relay (Figure 2), it has been identified that the unit does contain a CPLD which meets the definition of a digital device under the guidance of NEI 01-01. See Figures 1 and 2 below:

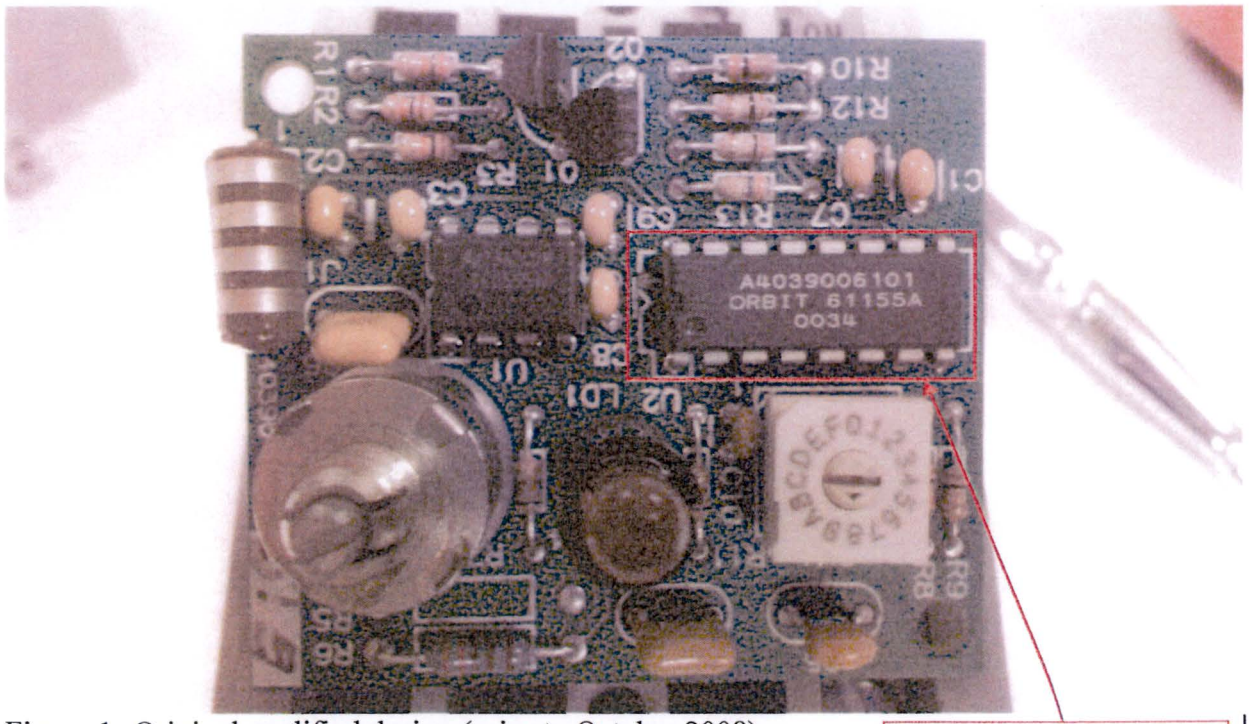


Figure 1- Original qualified design (prior to October 2008).
Relays supplied prior to October 2008 are not affected by this issue.

Original component

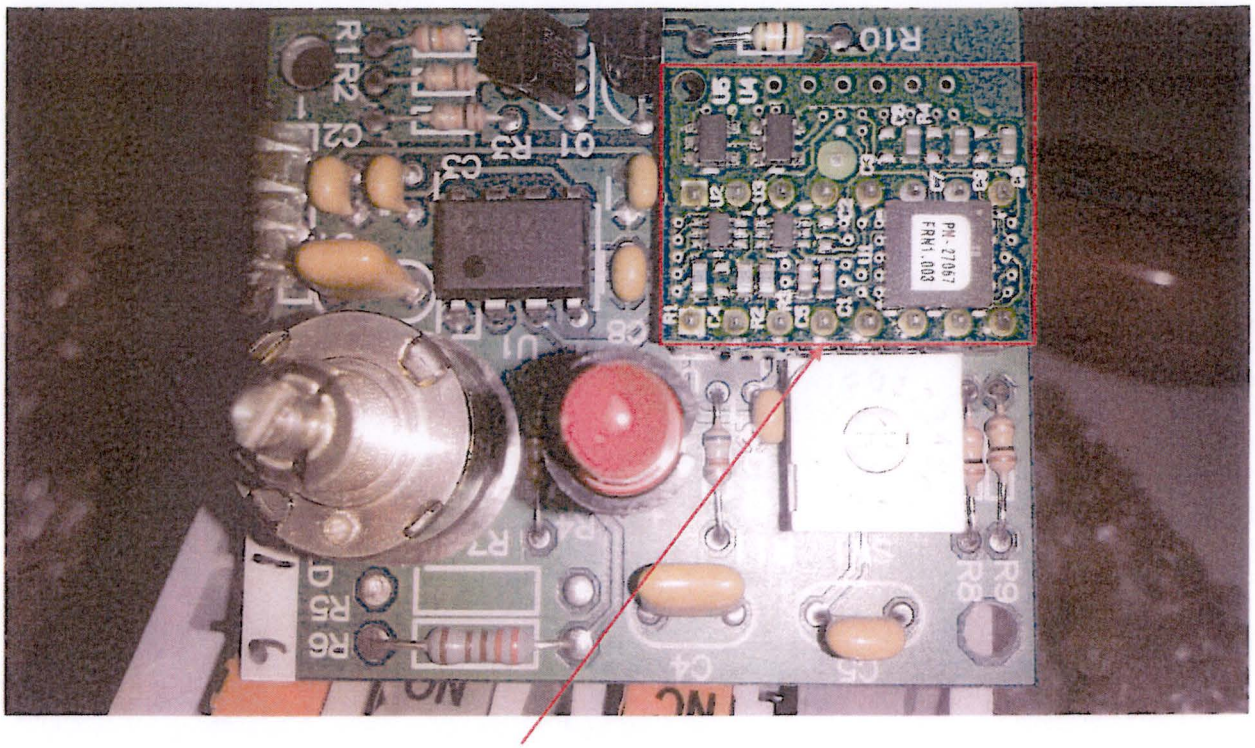


Figure 2 - New design circuit board and CPLD that replaced the original component.

(v) The date on which the information of such defect or failure to comply was obtained.

On April 27, 2015, enough information was gathered from the evaluations being performed to determine the reportability of the failure to comply that is the root cause for the event.

(vi) **In the case of a basic component which contains a defect or fails to comply, the number and location of these components in use at, supplied for being supplied for, or may be supplied for, manufactured or being manufactured for one or more facilities or activities subject to the regulations in this part.**

Relays that have been procured and dedicated from October 2008 to present are identified below.

Plant Name	Purchase order	Serial Number
Browns Ferry	72923-1	29760-001-00003
Ginna Station	6617899	51475-001-00001 and -00002, 52656K1-01-0001
Grand Gulf	10304816	34182-001-00001
Grand Gulf	10400205	56319-001-00001
Invensys	4540216542	39228-001-00001 thru -00017, 39228-001-00158 thru 39228-001-00166, 39228-001-00170 thru 39228-001-00177
KHNP	Y12-0292-010	39407-001-00001 thru -00008, 39407-002-00001 thru -00005
Lungmen	8749411E007C0	38486-001-00001 and -00002, 38486-002-00001
Millstone	45735761	31998K1-01-0001
Millstone	45735761	31391-001-00001
Nine Mile Point	530734	63245-001-00001 thru -00018
North Anna	70239037	55133-001-00001 & -00002
North Anna	70239037	39602-001-00001 and -00002, 39602-002-00001 thru -00003
North Anna	70239037	40033-001-00001 and 40033-001-00002, 40033-002-00001 thru -00003
OPPD Ft Calhoun	155213	33846-001-00001 thru -00009, 33846-001-00011 thru 33846-001-00015, 33846-002-00002 & -00003
OPPD Ft Calhoun	163495	35941-001-00001 thru -00004
OPPD Ft Calhoun	164936	35891K1-01-0001 thru -0005
OPPD Ft Calhoun	164936	36888-001-00001, -00003 thru -00005
OPPD Ft Calhoun	164936	36888K2-01-0001
OPPD Ft Calhoun	177878	39194-001-00001 thru -00006
OPPD Ft Calhoun	182681	40743-001-00001 thru -00003, 40743-002-00001
OPPD Ft Calhoun	187625	51477-001-00001 thru -00004
Perry Station	45354401	33357-001-00001 thru -00003
River Bend Station	10349942	38585-001-00001 thru -00004
River Bend Station	10362573	40077-001-00001
River Bend Station	10378904	51627-001-00001
South Texas Project	134783	33750-001-00001 & -00002

South Texas Project	147962	37204-001-00001 thru -00006
South Texas Project	154172	51592-001-00001 thru -00004
South Texas Project	171193	57894-001-00001 thru -00006
St Lucie	Bechtel PO: 25486-974-FPA-EMR0-00001	38549-001-00002 thru -00005

(vii) The corrective action which has been, is being, or will be taken; the name of the individual or organization responsible for the action; and the length of time that has been or will be taken to complete the action.

The relays that are currently in stock at NLI have been placed on hold until after the units have been determined to be qualified for the specific application. NLI has completed the EMC qualification testing per the requirements of EPRI TR-102323 Rev. 4 for the following tests, as applicable: CE101, CE102, RE101, RE102, RS101, RS103, CS101, CS114, CS115 and CS116.

The results were satisfactory with exception of the following condition: During Conducted Susceptibility CS114 onto the power lines, with the timing circuit in operation, the instantaneous contacts exhibited chatter in the range of 2.6 MHz to 20.3 MHz. The unit requires a ferrite to be installed onto the input power lines of the relay with 3 turns through the ferrite core. In this modified configuration, the relay was not susceptible to Conducted Susceptibility and successfully passed the required test per CS114.

In addition to the EMC testing that was performed, the Verification and Validation / Dedication activities for the digital device was also completed. The results of the dedication activity are contained in NLI Verification and Validation/Dedication report VVR-700RTC-01, Rev. 1. The results of the V&V/dedication activity are satisfactory. The firmware version verified is the only version that has been released since the change was implemented.

(viii) **Any advice related to the defect or failure to comply about the facility, activity, or basic component that has been, is being, or will be given to purchasers or licensees.**

The functions of the relays supplied by NLI were tested for the following critical characteristics:
Pick-up at rated voltage
Drop-out when the voltage is removed
Pick-up at degraded voltage
Over-Voltage operation
Insulation resistance
Off delay settings are adjustable from 2-120 seconds
Pick-up voltage
Drop-out voltage
Dimensions and Configuration

The relays are dedicated for generic application usage in timing applications. The specific plant application(s) is unknown by NLI. The EMC qualification of the relay is dependent on the installed configuration and location in the plant. The plant should evaluate whether the installed relays are subjected to the specific EMI/RFI condition Conducted Susceptibility CS114 between the frequencies of 2.6 MHz to 20.3 MHz identified above.

Please contact me with any questions or comments.

Sincerely,

Tracy Bolt
Director of Quality Assurance

Technical Bulletin

TB-16-001, Revision 0

Allen-Bradley 700RTC Ferrite Installation

TB-16-001, Rev. 0

August 2016

Technical Bulletin

TB-16-001, Revision 0

Allen-Bradley 700RTC Ferrite Installation

This technical bulletin has been prepared in accordance with NLI Quality Assurance Program

Prepared by: _____ date: 8/12/16
Bob Queen

Verified by: _____ date: 8/12/16
CHRIS TRUBLE

Approved by: _____ date: 8/15/2016
TRACY BOLT

REVISION HISTORY

Revision	Description	Date
0	Original Issue	8/15/2016

1.0 Issue Description

The purpose of this bulletin is to address installation of ferrites on the Allen-Bradley 700RTC relays with date codes October 2008 and after.

During all phases of the EMI/RFI testing, the delay contacts behaved normally. However, the EMI/RFI testing revealed that if a conducted disturbance occurred during the time delay sequence that the instantaneous contact would change state. Failing contact chatter (>2ms) was present on the NC Instantaneous Contact during CS114 testing applied to the input power lines.

At 2.6MHz - Audible Clicking apparent from the Relay.
At 3.4MHz - First Change in State of the NC Instantaneous Contact
At 20.3MHz - Last Change in State of the NC Instantaneous Contact - Normal function resumed.

By installing a ferrite with 3 turns through the ferrite, the condition was prevented.

2.0 Recommendations

It is strongly recommended that the plant install the recommended ferrites on all Allen-Bradley 700RTC relays with date codes October 2008 and after.

3.0 Installation Instructions

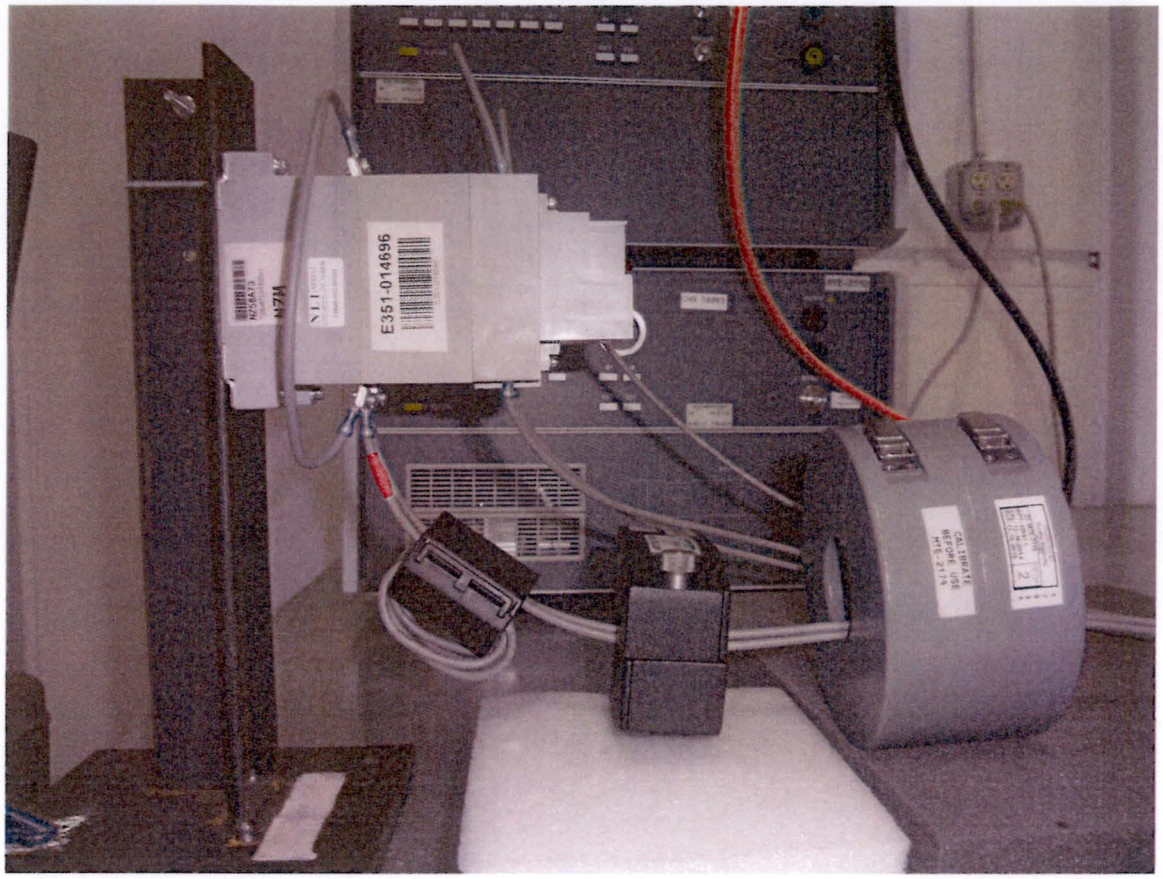
Verify that there is at least 18 inches of service loop on the 2 power wires to the relay.

Verify that you have a Fair Rite Part Number 0475176451.

The installation should be done with both power wires through one ferrite bead.

Open the ferrite clamp. Start as close as possible to the relay and wrap the input power wires (2) through the middle of the ferrite and around the back of the ferrite. After three complete loops through the ferrite, close the ferrite being careful not to catch the wires in the pinch points of the closed ferrite.

Verify that both of the latches on the ferrite are securely closed.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BEFORE USE