Part 21 (PAR) Event # 49932

Rep Org:	UNITED CONTROLS INTERNATIONAL	**Notification Date / Time:**	03/19/2014 15:36 (EDT)
Supplier:	UNITED CONTROLS INTERNATIONAL	**Event Date / Time:**	03/18/2014 (EDT)
		Last Modification:	04/17/2014
Region:	1	**Docket #:**	
City:	NORCROSS	**Agreement State:**	Yes
County:		**License #:**	
State:	GA		
NRC Notified by:	KORINA LOOFT	**Notifications:**	BLAKE WELLING R1DO
HQ Ops Officer:	DANIEL MILLS		PART 21 GROUP EMAIL
Emergency Class:	NON EMERGENCY		
10 CFR Section:			
21.21(d)(3)(i)	DEFECTS AND NONCOMPLIANCE		

PART 21 - THOMAS AND BETTS PRINTED CIRCUIT BOARDS

The following was received via fax:

"This report documents the supply of faulty Logic Power supply assembly printed circuit boards for a Cyberex 20KVA Model AC Power Supply. These power supplies have the incorrect strap installed on the transformers of Cyberex P/N [Part Number] 30-80-56620 which potentially can lead to the transformer being loose and can cause failure of the power supply. Per the manufacturer, the band should have been made of stainless steel but the bands on the installed transformers were made of carbon steel and a corrosion resistant coating. The details of the potential failure of the power supply and the root cause are being evaluated and will be documented in the final report.

"UCI [United Controls International] reviewed all the orders that were supplied to the customers and determined that two UCI orders are affected and the customer was notified on the day the issue was identified."

Part Number 90-41-974313 (UCI serial numbers 03996-01 -0001, -0002, -0003) and P/N 41-01-596701 (UCI serial numbers 03967-03 -0001, -0002, -0003) supplied to Public Service Electric and Gas (PSEG) are affected.

* * * UPDATE ON 4/17/2014 AT 1442 EDT FROM KORINA LOOFT TO DONG PARK * * *

The following was received via fax:

"This engineering evaluation is being written to document the supply faulty Power supplies for the 20KVA Cyberex Model AC Power supply with the Cyberex part numbers 41-01-596701 and 90-41-974313.

IE19
NRR

"SUMMARY: UCI issued a certificate of conformance to PSEG for S/N: 003967-03-0001 thru 0003 on December 22nd 2012, to be used in safety related applications where seismic is the only design basis event. During the pre-installation testing in February 2014, PSEG identified loose transformers and a loud noise frequency whine and the power supply boards were returned to UCI. Below table lists the details of the power supplies that were returned to UCI.

"On February 2nd 2014, UCI has initiated part 21 evaluation to determine the root cause for the failure and evaluate if a defect existed. During the evaluation, it was determined that the transformer strap band installed on Cyberex P/N 30-801-56620 transformer at the location T501 should have been made of stainless steel but the strap band on these power supplies was made up of zinc plated carbon steel. Due to this material difference, the transformer warped and it was evident it became loose.

"The installation of the incorrect strap bands on the transformer apply to only one batch of manufactured PCB assemblies. The manufacturer addressed this issue since this was discovered and this was verified by UCI. UCI determined that the order along with the boards that failed pre-installation testing, were the only boards affected by this issue. The customer PSEG was notified on March 13th 2014 and the initial notification letter to NRC was sent on March 19th 2014.

"The above mentioned power supplies were recalled from PSEG and two power supply boards of S/N: 003996-01-0002 and 003996-01-0003 are currently at UCI for evaluation and rework. However the S/N: 003996-01-0001 board has not yet been returned to UCI by PSEG. UCI performed an XRF analysis on one of the affected power supplies per part number lot and on UCI control samples to confirm and compare the material of the transformer strap bands.

"EFFECT OF THE DEFECT: The installation of the incorrect transformer strap band resulted in the loosening of the transformer from the band. When installed in the system, the transformer might become loose and cause a loud whining noise. The installation of the incorrect material band on the transformer might lead to loosening of the transformer and causes whining noise when installed but no functional test failure will be observed. However, the loose transformer affects the safety function of the item during or after seismic event due to loss of structural integrity.

"CORRECTIVE ACTIONS PERFORMED: A UCI corrective action # CAR 14-14 was opened to document the issue found and the corrective and preventive actions taken. As a result, UCI will create two new Commercial Grade dedication procedures for P/N: 41-01-596701 and 90-41-974313 to include the material verification of the transformer bands installed on these power supplies. These new procedures will be used for the existing and future orders of these part numbers.

"All the affected power supply boards except S/N: 003996-01-0001 are currently at UCI undergoing rework to replace the transformer of the incorrect material strap band with a transformer of the correct (stainless steel) strap band. After rework, dedication will be performed per new dedication procedures as specified above."

Notified R1DO (Burritt) and Part 21 Group via email.

****

UCI
FAX TRANSMITTAL

DATE:	April 17, 2014		
TO:	NRC OPERATIONS CENTER	**FROM:**	Korina Looft/UCI
FAX:	301-816-5151	**FAX:**	770-496-1422
TEL:	301-816-5100	**TEL:**	770-496-1406
CC:	Part 21 Final Report for Event No. /Accession No. ML14085A013	**PAGES:**	14 pages with cover page

COMMENTS:
I WILL FOLLOW UP AS DIRECTED TO MAKE SURE THE FAX TRANSMITTAL WAS RECEIVED.

THANK YOU,

KORINA LOOFT

UNITED CONTROLS INTERNATIONAL

10CFR21 FINAL REPORT

April, 17th 2014

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington D.C. 20555-0001

Subject: 10CFR21 Reporting of Defects and Non-Compliance
Thomas & Betts Printed Circuit Boards P/N 41-01-596701 and P/N 90-41-974313

This final report documents the supply of faulty Logic Power supply assembly printed circuit boards for a Cyberex 20KVA Model AC Power Supply. These power supplies have the incorrect strap installed on the transformers of Cyberex P/N 30-80-56620. Due to this material difference, the transformer warped and it was evident it became loose. The details of the potential failure of the power supply and the root cause are documented in the attached final report (United Controls International, Engineering Evaluation Report, EER-14-6216-01, Rev.0).

Sincerely,

Robert B. Hale

Robert B. Hale

President
United Controls International
205 Scientific Drive
Norcross, GA 30092
(770) 496-1406 Phone
(770) 496-1422 Fax

UNITED CONTROLS INTERNATIONAL

ENGINEERING EVALUATION REPORT

EER-14-6216-01

Revision 0

Part 21 Evaluation Final Report of Printed Circuit Boards

Prepared By: Sameera Jeereddy Engineering Date: 4/17/14

Reviewed By: Divya Pandy Engineering Date: 4/17/14

Approved By: Donna Lobb Quality Assurance Date: 4/17/14

Revision History:

Date	Revision	Description
04/17/14	0	Initial Issue

1.0: References:

A. Email from the manufacturer stating that the issue is confined to one batch of boards, Dated March 07th 2014.
B. UCI XRF Material test report # 6216X-01, Rev.0
C. UCI XRF Material test report # 6259X-01, Rev.0
D. UCI XRF Material test report # 6216X-02, Rev.0
E. Email from the manufacturer stating the effect of the defect, Dated March 20th 2014.
F. Email from PSEG stating that no immediate concern is necessary, Dated April 16th 2014.

2.0: Description:

This engineering evaluation is being written to document the supply faulty Power supplies for the 20KVA Cyberex Model AC Power supply with the Cyberex part numbers 41-01-596701 and 90-41-974313.

3.0: Technical Evaluation / Analysis / Disposition:

SUMMARY: UCI issued a certificate of conformance to PSEG for S/N: 003967-03-0001 thru 0003 on December 22nd 2012, to be used in safety related applications where seismic is the only design basis event. During the pre-installation testing in February 2014, PSEG identified loose transformers and a loud noise frequency whine and the power supply boards were returned to UCI. Below table lists the details of the power supplies that were returned to UCI.

Table 1

Part Number	UCI Sales order-line Number	UCI Serial Number	Qty.	Customer Name	Customer PO #	Customer PO line	Current Status
41-01-596701	003967-03	003967-03-0001 003967-03-0002 003967-03-0003	3	Public Service Electric & Gas (PSEG)	4500576271	00030	Returned by PSEG on 02/14/14 and at UCI for evaluation

On February 2nd 2014, UCI has initiated part 21 evaluation to determine the root cause for the failure and evaluate if a defect existed. During the evaluation, it was determined that the transformer strap band installed on Cyberex P/N 30-80-56620 transformer at the location T501 should have been made of Stainless Steel but the strap band on these power supplies was made up of Zinc plated carbon Steel (See Table 3 for material test results on one of these boards). Due to this material difference, the transformer warped and it was evident it became loose.

Per the manufacturer's attached email (Attachment 1), the installation of the incorrect strap bands on the transformer apply to only one batch of manufactured PCB assemblies. The manufacturer addressed this issue since this was discovered and this was verified by UCI. UCI determined that the below mentioned order along with the boards that failed pre-installation testing, were the only boards affected by this issue. The customer PSEG was notified on March 13th 2014 and the initial notification letter to NRC was sent on March 19th 2014.

Table 2

Part Number	UCI Sales order-line Number	UCI Serial Number	Qty.	Customer Name	Customer PO #	Customer PO line	Current Status
90-41-974313	003996-01	003996-01-0001 003996-01-0002 003996-01-0003	3	Public Service Electric & Gas (PSEG)	4500579283	00010	Recalled from PSEG (Notified on 03/13/14)

The above mentioned power supplies were recalled from PSEG and two power supply boards of S/N: 003996-01-0002 and 003996-01-0003 are currently at UCI for evaluation and rework. However the S/N: 003996-01-0001 board has not yet been returned to UCI by PSEG. UCI performed an XRF analysis on one of the affected power supplies per part number lot and on UCI control samples to confirm and compare the material of the transformer strap bands. The table below lists the material test results.

Table 3

Part Number	UCI Sales Order/Serial Number	Material	Material test Report #	Attachment #
41-01-596701	003967-03-0001	Nickel-Tin plated Carbon Steel	6216X-02, Rev.0	Attachment 4
90-41-974313	003996-01-0003	Nickel-Tin plated Carbon Steel	6259X-01, Rev.0	Attachment 3
41-01-596701	2200-1-2 (Control Sample)	Stainless Steel 304	6216X-01, Rev.0	Attachment 2
90-41-974313	1808-01-CS (Control Sample)	Stainless Steel 304	6216X-01, Rev.0	Attachment 2

EFFECT OF THE DEFECT:

The installation of the incorrect transformer strap band resulted in the loosening of the transformer from the band. When installed in the system, the transformer might become loose and cause a loud whining noise. Per the manufacturer's email (Attachment 5), the installation of the incorrect material band on the transformer might lead to loosening of the transformer and causes whining noise when installed but no functional test failure will be observed. However, the loose transformer affects the safety function of the item during or after seismic event due to loss of structural integrity.

AFFECTED USERS:

Tables 1 and 2 list all the affected power supplies and all the serial number of the boards that are at UCI for evaluation and rework except S/N: 003996-01-0001 which is installed in the plant at PSE&G. PSE&G was notified about the issue; PSE&G performed an evaluation internally and determined that no immediate impact was necessary (See Attachment 6).

CORRECTIVE ACTIONS PERFORMED:

A UCI corrective action # CAR 14-14 was opened to document the issue found and the corrective and preventive actions taken. As a result, UCI will create two new Commercial Grade dedication procedures for P/N: 41-01-596701 and 90-41-974313 to include the material verification of the transformer bands installed on these power supplies. These new procedures will be used for the existing and future orders of these part numbers.

All the affected power supply boards except S/N: 003996-01-0001 are currently at UCI undergoing rework to replace the transformer of the incorrect material strap band with a transformer of the correct (stainless steel) strap band. After rework, dedication will be performed per new dedication procedures as specified above.

4.0: Attachments:

1. Email from the manufacturer stating that the issue is confined to one batch of boards, Dated March 07th 2014.
2. UCI XRF Material test report # 6216X-01, Rev.0
3. UCI XRF Material test report # 6259X-01, Rev.0
4. UCI XRF Material test report # 6216X-02, Rev.0
5. Email from the manufacturer stating the effect of the defect, Dated March 20th 2014.
6. Email from PSEG stating that no immediate concern is necessary, Dated April 16th 2014.

Attachment 1

From: Harry Orrock
To: Sameera Jeereddy
Subject: Re: P/N: 41-01-596701 Transformer Mounting Issues
Date: Friday, March 07, 2014 3:07:43 PM

Good afternoon, Sameera.

RBB response:

I do not know a specific batch that had bad bands. I can tell you the serial numbers to the assembly's that have the transformer with the new upgraded to stainless steel band. I hope this is helpful.

Entry Date	AlternateKey1	UCI	SN (S)	WITNESS JOB
5/17/2011	41-01-596701	Y	37	38127
12/22/2011	41-01-596701	Y	038-040	41962
1/26/2012	90-41-974313	Y	014-015	40901
3/29/2013	41-01-596701	Y	41	44489

Have a great rest of the day, and an even better weekend!

Regards,

Harry Orrock, Jr.

Quality Specialist
Thomas & Betts Power Solutions
A Member of the ABB Group
804-236-4061 (Office)
804-236-4047 (Fax)
e-mail: *harry.orrock@tnb.com*
Thomas & Betts Power Solutions provides power quality solutions that protect critical points in the electrical infrastructure under the following brands: Current Technology, Cyberex, Joslyn Electronics, and United Power.

On Wed, Feb 19, 2014 at 10:26 AM, Sameera Jeereddy <Sleereddy@unitedcontrols.com> wrote:

> Harry,
>
> If this is confined to only one batch, is there a way to figure out if the transformers from this batch were used on any other boards? We are trying to recall the boards with these transformers from the plants and wanted to see if we can short list any of them.

Thanks!

Sameera Jeereddy

Lead Engineer-Electrical Dedication

United Controls International

(770) 496-1406 ext. 150

From: Harry Orrock [mailto:harry.orrock@tnb.com]
Sent: Tuesday, February 18, 2014 5:16 PM
To: Wesley Hickle
Cc: Craig Perkey; Sameera Jeereddy
Subject: Re: P/N: 41-01-596701 Transformer Mounting Issues

Good evening, Wesley.

Engineering response concerning your corrective action question on p/n 41-01-596701:

Nothing has changed on that part and no Corrective Actions have been issued. It was an isolated incident and was confined to that one batch. We have not seen any other instances.

Have a great evening!

Regards,

Harry Orrock, Jr.

Quality Specialist

Thomas & Betts Power Solutions

A Member of the ABB Group

United Controls International ☐ 205 Scientific Drive ☐ Norcross, GA 30092

XRF CHEMICAL TEST REPORT

Report #: 6216X-01	Rev: 0	Date :	April 14, 2014
Description / Item :	POWERSUPPLY-LOGIC ASSEMBLY / 41-01-596701		
Material Designation:	Not Specified		
	☑ DESTRUCTIVE TEST ☐ NON-DESTRUCTIVE TEST		
XRF Analyzer:	Model: XL3t 800S S/N: 55898		Tested per QCP 10.15
Test Duration (≥5sec)	Minimun 5 Sec	Match number (≤2):	0.37-0.52

Test Results

Composition : Weight %

Alloy Reference Chemistry	Ni	Cr	Fe	Mn	Mo								Positive Material Identification	
ASTM A240/A240M-13c Type 304	8.0 10.5	17.5 19.5	-	2.00 Max.	–									
Sample ID														
2200-1-2 Transformer Band	8.3	18.0	70.99	1.74	0.39								SAT(1)	
1808-01-CS Transformer Band	8.1	18.0	71.24	1.66	0.38								SAT(1)	

(1) Measured elements on the base material are consistent with stainless steel Type 304 (UNS No. S30400) composition specified in ASTM A240/A240M-13c

	Signature	Date
Tested BY:		4/14/14
Validated By:		4/14/14
Reviewed By:		4/14/14

UCI
TESTING CONTROLS INSTRUMENTS
225 Scientific Drive
Norcross, Georgia 30092
Tel : (770) 441-1104
Fax: (770) 476-1472

XRF CHEMICAL TEST REPORT

Report #: 6259X-01 **Rev:** 0 **Date :** April 9, 2014

Description / Item : LOGIC POWER SUPPLY / 90-41-974313

Material Designation: Not Specified

☑ DESTRUCTIVE TEST ☐ NON-DESTRUCTIVE TEST

XRF Analyzer: Model: XL3t 900S S/N: 55898 Tested per QCP 10.15

Test Duration (≥5sec) Minimun 5 Sec **Match number (≤2):** 0.53

Test Results

Composition : Weight %

Alloy Reference Chemistry	Sn	Ni	Co[3]	Ti[3]	Fe	Sn	Ni	Co	Fe	Mn	Ti	S	P	Positive Material Identification	
	Before Strip	Before Strip	Before Strip	Before Strip	Before Strip	After Strip	After Strip	After Strip	After Strip	After Strip	After Strip	After Strip	After Strip		
ASM Metals Handbook , Vol.1, 10 th edition, Carbon steel	–	–	–	–	–	–		–	–	1.00 Max.	–	0.050 Max.	0.040 Max.		
Sample ID															
006259-01-00003A *Transformer band installed on 003996-01-0003*	2.16	20.28	0.98	0.20	76.13	0.03	0.11	0.00	98.57	0.21	0.00	0.000	0.000	SAT[1][2]	

(1) The samples were found to be Nickel(Ni) - Tin (Sn) Plated carbon steel based on differential evaluation of "Before Strip" and "After Strip" testing

(2) Measured elements on the base material are consistent with Carbon Steel composition specified in the ASM Metals Handbook Volt, 10 th edition - Information Only

(3) Other elements such as Cobalt (Co) and Titanium are present in the plating - Information only

	Signature	Date
Tested BY:	Rodriguez	4/9/14
Validated By:	Rodriguez	4/9/14
Reviewed By:	Fiorelli	4-9-14

205 Scientific Drive
Norcross, Georgia 30092
Tel: (770) 449-7520
Fax: (770) 496-1723

XRF CHEMICAL TEST REPORT

Report #: 6216X-02 **Rev:** 0 **Date :** April 15, 2014

Description / Item : POWERSUPPLY-LOGIC ASSEMBLY / 41-01-596701

Material Designation: Not Specified

☑ DESTRUCTIVE TEST ☐ NON-DESTRUCTIVE TEST

XRF Analyzer: Model: XL3t 900S S/N: 55898 Tested per QCP 10.15

Test Duration (≥5sec) Minimun 5 Sec **Match number (≤2):** 0.12

Test Results

Composition : Weight %

Alloy Reference Chemistry	Sn	Ni	Co[3]	Ti[3]	Fe	Sn	Ni	Co	Fe	Mn	Ti	S	P	Positive Material Identification	
	Before Strip	Before Strip	Before Strip	Before Strip	Before Strip	After Strip	After Strip	After Strip	After Strip	After Strip	After Strip	After Strip	After Strip		
ASM Metals Handbook , Vol.1, 10 th edition, Carbon steel	–	–	–	–	–	–		–	–	1.00 Max.	–	0.050 Max.	0.040 Max.		
Sample ID															
006216-01-00001 Transformer band installed on 003967-03-0001	2.23	20.23	0.73	0.20	76.45	0.03	0.16	0.00	98.62	0.22	0.00	0.031	0.000	SAT[1][2]	

(1) The samples were found to be Nickel(Ni) - Tin (Sn) Plated carbon steel based on differential evaluation of "Before Strip" and "After Strip" testing

(2) Measured elements on the base material are consistent with Carbon Steel composition specified in the ASM Metals Handbook Vol1, 10 th edition - Information Only

(3) Other elements such as Cobalt (Co) and Titanium are present in the plating - Information only

	Signature	Date
Tested BY:		04/15/14
Validated By:		4/15/14
Reviewed By:		4/15/14

Attachment 5

From:	Harry Orrock
To:	Sameera Jeereddy
Cc:	Timothy Beatty
Subject:	Re: P/N: 41-01-596701 Transformer Mounting Issues
Date:	Thursday, March 20, 2014 3:41:15 PM

Good afternoon, Sameera.

RBB response:

These boards emit a loud high frequency whine during normal operation.

Some of the noise is directly from the large transformer.

The noise can be quite irritating especially during a bench test or when the system cabinet is open.

A transformer that is loose will emit more noise. This is the only effect that I know of, but since the noise can be quite irritating, the quieter the unit is the better.

The power supply will still deliver the correct voltages.

Have a great rest of the day!

Regards,

Harry Orrock, Jr.

Quality Specialist
Thomas & Betts Power Solutions
A Member of the ABB Group
804-236-4061 (Office)
804-236-4047 (Fax)
e-mail: *harry.orrock@tnb.com*

On Wed, Mar 19, 2014 at 3:24 PM, Sameera Jeereddy <SJeereddy@unitedcontrols.com> wrote:

> Harry,

There is a recent failure that we encountered where there was loud high frequency whine encountered during the pre-installation testing and the transformer was loose. So, I am trying to figure out how the function of the board is affected with the transformer becoming loose and if it is installed in the system.

Thanks!

Sameera Jeereddy

Lead Engineer-Electrical Dedication

United Controls International

(770) 496-1406 ext. 150

From: Harry Orrock [mailto:harry.orrock@tnb.com]
Sent: Wednesday, March 19, 2014 2:36 PM
To: Sameera Jeereddy
Subject: Re: P/N: 41-01-596701 Transformer Mounting Issues

Good afternoon, Sameera.

RBB response:

I think that if someone encounters a transformer on an **older** board that is loose to the extent of causing excess vibration, the transformer should be replaced. If the transformer is not loose then the unit will operate reliably.

I have not typically seen the band break except on ***very old*** units where the transformer was visibly overheated or in shipping where the unit likely experienced severe shock.

Have a great rest of the day!

Regards,

Attachment 6

From: Patrick Jackson
To: Sameera Jeereddy
Subject: Fwd: Part 21 Initial Notification Report
Date: Wednesday, April 16, 2014 3:46:48 PM

Sent from my iPhone

Begin forwarded message:

From: "Thompson, Joseph" <Joseph.Thompson@pseg.com>
Date: April 16, 2014 at 3:32:32 PM EDT
To: Patrick Jackson <PJackson@unitedcontrols.com>
Subject: Re: Part 21 Initial Notification Report

Patrick,
Although the final evaluation isn't due until tomorrow, an interim disposition has been entered that states that the carbon steel strap is not an immediate concern.

Sent from my BlackBerry 10 smartphone on the Verizon Wireless 4G LTE network.

From: Patrick Jackson
Sent: Wednesday, April 16, 2014 2:19 PM
To: Thompson, Joseph
Cc: Sameera Jeereddy
Subject: FW: Part 21 Initial Notification Report

Joe,

Per our earlier conversation, is there any way that you can send that report to us so that we can attach it to the NRC letter.

Thanks,

Patrick

From: Patrick Jackson
Sent: Wednesday, April 16, 2014 1:06 PM
To: Sameera Jeereddy
Subject: RE: Part 21 Initial Notification Report

That seems to be the case. They must have figured the carbon would hold for another few months.

Either way they evaluated and elected to move on with the one that they have.