

Notable Event

Event Title: PHY-21-0721-Student Receives two 120V shocks - No injury

Date Submitted: 08/02/2021 02:01:05 PM

Response Owner: Rolf Ent (ent)

Category: Personnel Safety

Date of Occurrence: 07/21/2021 02:15 pm

Event Location: 90_1.109

Date Notable Event Report is Due: 08/19/2021

Short Summary of Event and/or Injuries

A student received two 120V shocks when using an as-received power cord and plug assembly. The assembly had two failure modes, both involving the separate plug ends, i.e., one on the male cord plug end, and one on the cannon plug connector end that mates with the CAEN equipment. Both shocks were a result of the compromised cannon plug.

Failure mode 1 involves the presence of an externally exposed metal screw that, during manufacturer assembly, had stripped wire insulation and was thus in contact with bare wire. Failure mode 2 was due to a compromised cannon plug (i.e., the plug that goes into the CAEN crate) that allowed for the "hot" prong to be mistakenly plugged into the ground receptacle.

Details of the Event and/or Injuries

While attempting to energize a new CAEN crate, a student received two 120V shocks while in contact with both the crate and a metal desk supplying power. Both shocks were due to a compromised cannon plug, as received from the vendor.

The cannon plug failure mode was discovered after the ORPS entry and initial safety flash email. This compromised cannon plug allowed for the "hot" prong to be inserted into the "ground" slot and thus energized the crate assembly. The plug design has a combination alignment key and lock ring that forces the plug insertion orientation to match up with three points - hot, neutral and ground. However, in this case, the lock ring was incorrectly able to rotate independently, enabling the "hot" prong to be inserted into the "ground" slot and energizing the crate. The insertion configuration was successfully re-created.

A related failure mode on the male plug involved contact between a screw shank with an externally exposed head and bare metal conductors. The screw had stripped these bare metal conductors of their insulation during manufacturer assembly, allowing for direct contact with a person's hand during plug in. This would also not have been visible to the user. As the investigation developed, this failure mode was ruled out as the direct cause in accordance with witness and supervisor discussions.

The compromised cord and plug assembly were as-received from the manufacturer new/in the box; They are CE rated.

The sequence of events follows. The student:

- attached the cannon plug end of the power cord to the crate,
- plugged the cord into an electrical socket on the metal desk
- activated the crate's power button
- plugged in the Ethernet connection
- noted that the crate was not properly communicating with his workstation
- adjusted the power cord while using his other hand to stabilize himself with the metal desk railing
- experienced a shock
- unplugged the Ethernet
- brushed another part of the CAEN crate with his hand while unplugging the Ethernet
- experienced another shock

The student promptly notified Mark Taylor, who was also working in the space. The student then called the supervisor, Chris Cuevas, who instructed them to go to OCCMED immediately. Mark escorted the student to OCCMED, which, due to MEDCON

4, did not have personnel onsite. Mark called the posted OCCMED number, received no answer, and went back to the EEL building to meet the student's supervisor to discuss the situation. By this time, the cable and CAEN crate had been locked out. It should be noted that OCCMED has provided multiple alternate contact numbers since the start of this Notable Event, and made this information broadly available. Pls see attached objective evidence.

While in the EEL building, they called OCCMED again and were directed to go to Port Warwick Urgent Care (note: per OCCMED, referral is the normal process for this type of event, regardless of MEDCON status). Mark drove the student to Port Warwick, where he was evaluated and released with no restrictions.

Extent of condition checks revealed one similar setup in EEL 109, which was evaluated and found to be in compliance. There are 4 other CAEN crate / power cord received in Hall B since March 2020 that will be checked as part of the Extent of Condition. Additionally, any other power cords with similar plug configurations will be checked; this will be coordinated by the Physics DSO.

FAR 52.212-04 Implied Warranty of Merchantability, was reviewed for recourse with the vendor. Although it is applicable and JSA has an established process, Procurement will not apply it in this situation, as JSA intends to keep and modify the power cord / plug assemblies to fit their needs and not return it.

Existing NE-2019-05-12-06 addresses JSA's response to OSHA's recently implemented non acceptance of CE ratings.

This is an ORPS (high) reportable event, number SC--TJSO-JSA-TJNAF-2021-0002.

Causal Analysis

Judgement of Needs

Doe Cause Code: A2: Equipment / Material Problem, B6: Defective, Failed or Contaminated, C1: Defective or failed part
Risk Code: 1

Vendor notification of as-received defective plug/power cord.

Corrective Action:

Action Owner(s): Chris Cuevas **Due Date:** 08/31/2021

Technical Representative to notify the vendor of the two failure modes, with pictures and explanation of events.

Evidence of completion: snapshot or copy of email sent. Vendor confirmation of receipt if available.

Root Cause

The manufacturer shipped a compromised power cord and plug assembly to JSA.

Extent of Condition Check

Risk Code: 3

Type: ORPS **ORPS Significance:** High **Associated Report Number:** SC--TJSO-JSA-TJNAF-2021-0002

Review PHY receipts of similar power cord / plug assemblies received from CAEN Technologies since March 2020 for the same two failure modes. If present, remove from service and label appropriately.

Does this event involve failed equipment? YES

Is there similar equipment in other areas? YES

Corrective Action:

Action Owner(s): Chris Cuevas **Due Date:** 08/31/2021

Review EEL109 and Hall B / counting house for the four assemblies that came in during MEDCON 4/5. Ensure that the plug

ends do not have the same two failure modes. If they do, remove from service and label appropriately.

Evidence of Completion: documentation of results. If failures are found, pictures indicating removal from service.

Corrective Action:

Action Owner(s): Ed Folts **Due Date:** 08/31/2021

Identify all power cord / cannon plug receipts from CAEN technologies since March 2020. Use the provided Purchase Req list. Check them all to ensure that the plug ends do not have the same two failure modes. If they do, remove from service and label appropriately.

Evidence of Completion: documentation of results. If failures are found, pictures indicating removal from service.

Lesson Learned

<https://misportal.jlab.org/ll/index.jsf?function=print&lessonId=1152>

PHY-21-0721 Student Receives Two 120V Electric Shocks

Records, Documents, Pictures, and Other References

see attached PPT for pictures

Emergency Notifications Made (Subsequent to the Event)

Occupational Medicine (269-7539): 07/21/2021

ESH&Q Reporting Officer (876-1750): 07/21/2021

Other (Supervisor): 07/21/2021

Documentation of Findings

Notable Event Number: PHY-21-0721

CATS Number: NE-2021-04

Lessons Learned Number: 1152

ORPS Number: SC--TJSO-JSA-TJNAF-2021-0002

NTS Number: [No Data]

CAIRS Entry: [No Data]

DOE Cause Code: A2 B6 C1

ISM Code: Provide Feedback and Continuous Improvement

Signatures

Investigation Team Steve Smith (sjsmith) 08/02/2021 02:01:40 PM

Investigation Team Tim Fitzgerald (tfitzger) 08/02/2021 02:35:12 PM

Investigation Team Chris Cuevas (cuevas) 08/02/2021 02:54:17 PM

Associate Director / Department Manager Rolf Ent (ent) 08/03/2021 10:12:46 AM

[EXTERNAL] Safety Flash

JLab ES&H <JLab_ES&H@jlab.org>

Fri 7/23/2021 11:31 AM

To: Steve Smith <sjsmith@jlab.org>

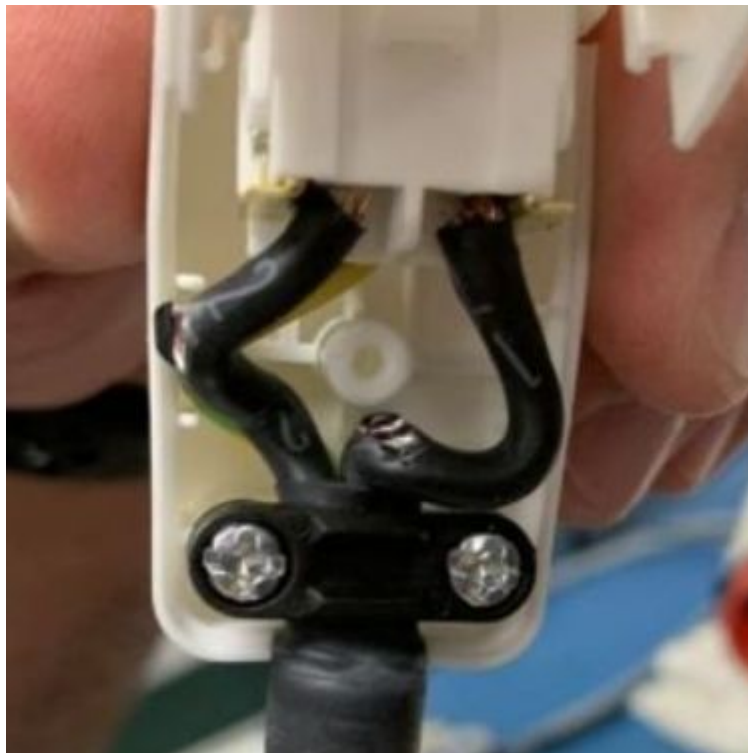
[View this email in your browser](#)



SAFETY FLASH

EVENT: Undergraduate student received a 120 volt shock while plugging in equipment - No injuries

DATE/TIME OF EVENT: July 21, 2021 at 2 p.m.



PURPOSE:

On July 21, 2021, an experimental physics division student working in the Experimental Equipment Lab (EEL), received an electrical shock while testing a new Verso Module Eurocard (VME) crate manufactured by Costruzioni Apparecchiature Elettroniche Nucleare (CAEN). The student immediately notified their supervisor of

the shock who coordinated with Occupational Medicine for evaluation. The student was evaluated at a local urgent care center and released for full duty with no restrictions later that day.

A preliminary investigation found the student was shocked when they touched a defective 120 volt plug supplied by the manufacturer with the VME crate. After the event, the suspect plug was disassembled and the insulation of a conductor was found to have been penetrated by a retaining screw on the plug shell when it was fabricated. This defect would expose anyone touching the plug to 120 volt and would not have been recognized by visual inspection only.

EVENT IMPACT:

The student suffered a momentary electrical shock but without any apparent injury. The equipment has been tagged out subject to further analysis and repair.

LESSONS LEARNED:

Even commercially procured equipment may have latent shock hazards upon receipt due to poor workmanship, inadequate inspection or quality control, or damage during shipment. Additional care should be used when initially powering up new equipment with plugs and connectors that are not standard in the country of origin.

WHAT WENT RIGHT?

The employee reported their shock immediately to their supervisor and the supervisor acted promptly to escort the student for medical evaluation.

CONTACT

ES&H WEB

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EEL109 LAB
MAINFRAME SUPPORTED ON WOODEN DOLLY
FRONT PANEL OF MAINFRAME

REAR PANEL

VOLTAGE RANGE:	100 - 240 V ~
FREQUENCY:	50 - 60 Hz
INPUT CURRENT:	25A MAX

PID  13148

120V INPUT CONNECTOR

GROUNDING POST

AC

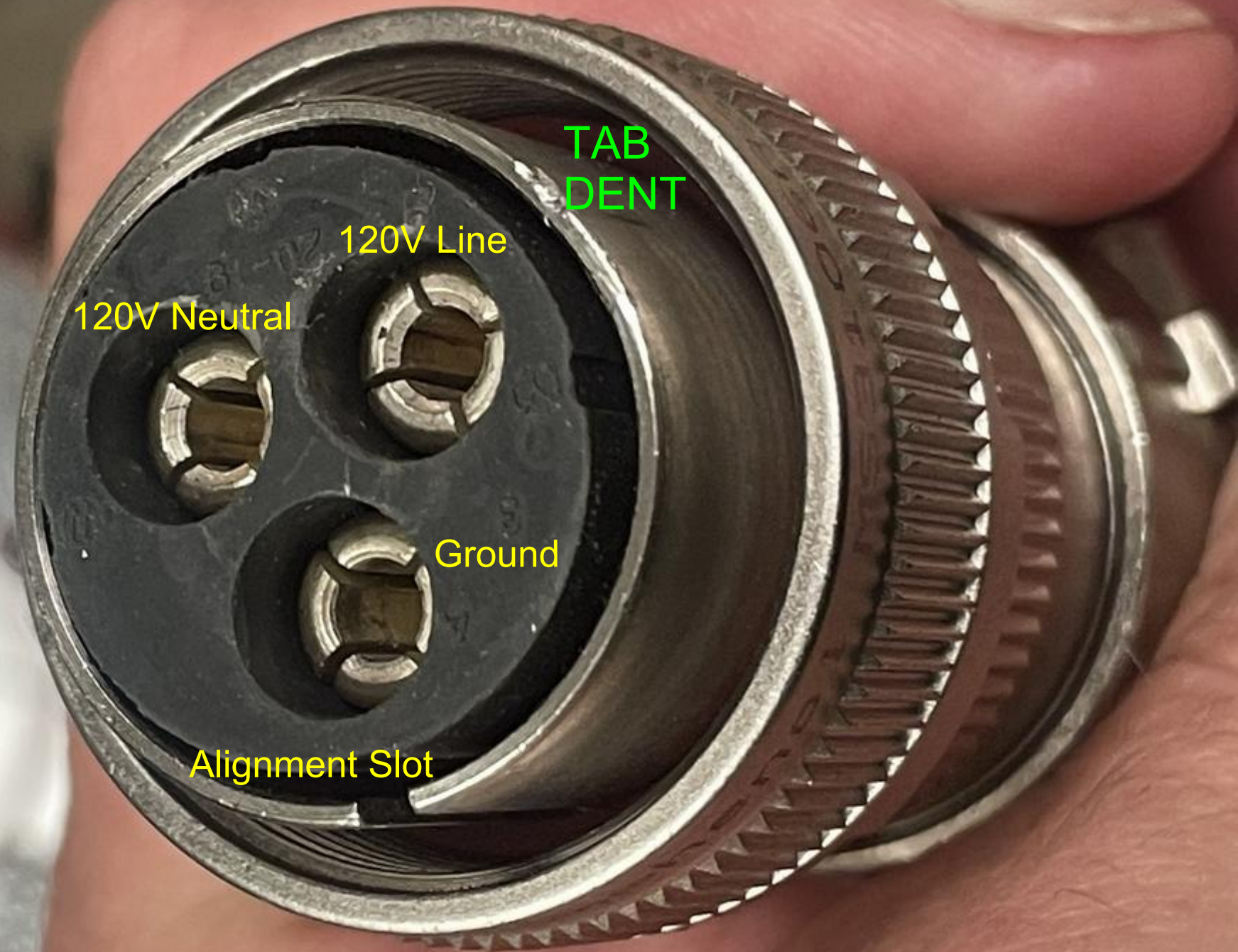


3 PIN FEMALE
SOCKET CONNECTOR
THREADS TO CHASSIS MALE PINS



3 PIN 120V PLUG

120V AC power cord connector
Mates with SY4527 CAEN mainframe



TAB
DENT

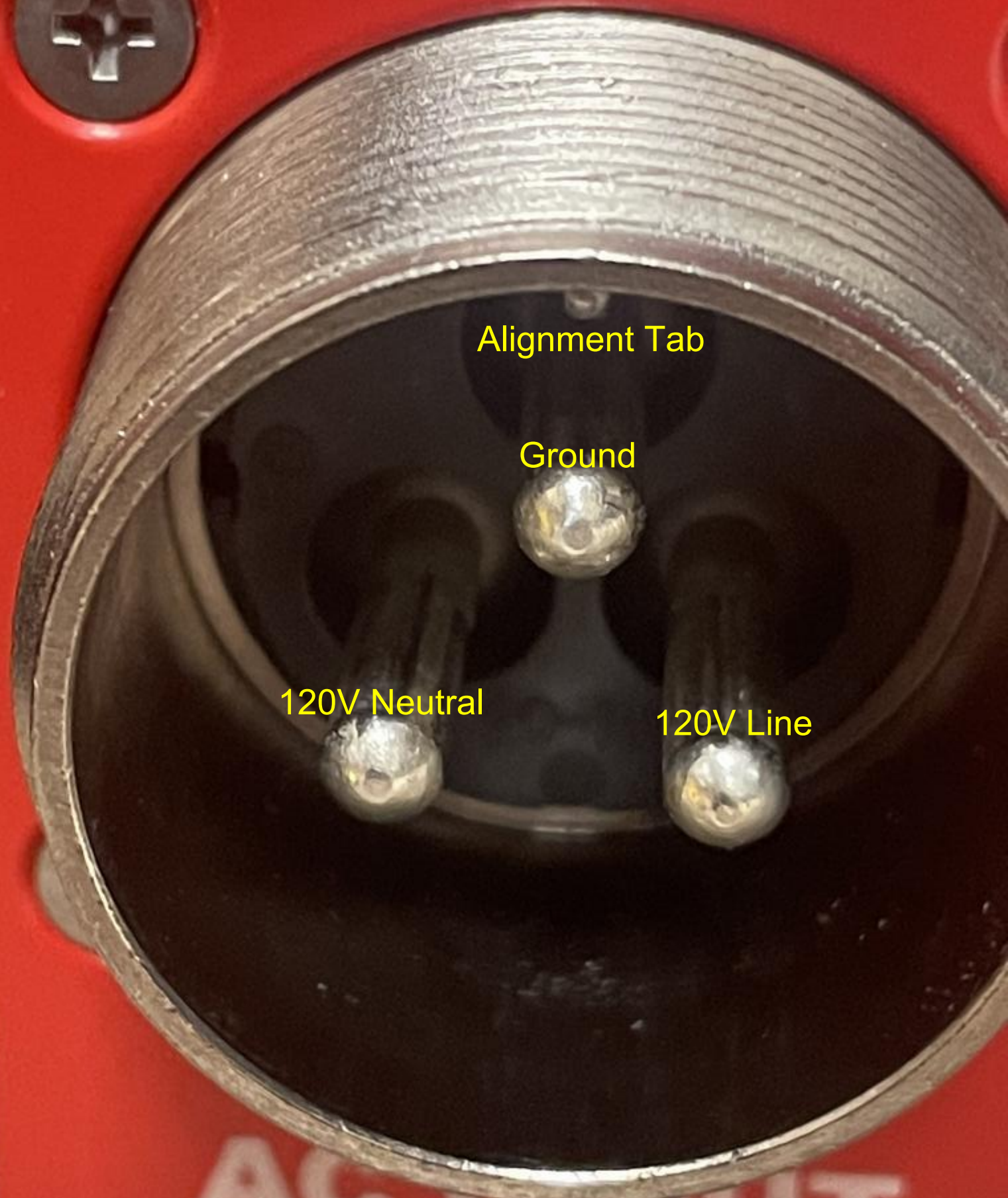
120V Line

120V Neutral

Ground

Alignment Slot

Rear Panel of SY4527 Mainframe
Input AC power connector



Alignment Tab

Ground

120V Neutral

120V Line

AC INPUT

SY4527 SIDE PANEL CHASSIS
CLOSE UP VIEW OF INTERNAL WIRING
ON BREAKER.
BROWN, BLUE, STRIPED GREEN/YELLOW AC WIRING





INSIDE REAR PANEL
GROUND POST

The image shows the interior of a server chassis. At the top, there is a circular ventilation grille with a grid of small holes. Below it, a black cable is connected to a silver ground post. Further down, a power connector is visible, with a red braided shielded cable and several colored wires (yellow, green, blue) plugged into it. The background shows the vertical slots of a server rack.

INSIDE REAR PANEL
POWER CONNECTOR
3 PIN WITH OUTER SHELL TO CHASSIS[GROUND]

SY4527 REAR PANEL
BOTTOM CHASSIS VIEW

REAR PANEL
FUSE

REAR PANEL BREAKER



PHY-21-0721 Student Receives Two 120V Electric Shocks

Statement of Lessons Learned

A student received two 120V shocks because a Cannon-plug lock-ring was installed incorrectly by the manufacturer and did not "lock" the plug into place (see Photo 1). Instead the lock-ring could rotate and the "hot" channel could be inserted into the "ground" channel and energize the crate. The discovered defects were not visible at the time of the incident.

Discussion of Activities

On July 21, 2021, a student was troubleshooting communications between a new computer aided engineering network (CAEN) crate and a workstation (see Photo 2). The first step was to verify that both ends of the power cord, provided by the manufacturer, were seated properly. The student verified that the plug end (Photo 3) was seated in the workstation outlet (Photo 4), then attempted to confirm that the Cannon-plug end was seated properly in the crate receptacle (See Photo 5). The student was stabilizing himself on the workstation with one hand while adjusting the Cannon-plug with the other when he felt the first shock.

While the student was unplugging the Ethernet cable, he brushed his hand over another part of the CAEN crate and experienced another shock. He promptly notified his supervisor who immediately escorted him to the Occupational Medical facility. The cable and CAEN crate were immediately locked out.

Analysis

The investigation found that the power cord was defective in two ways:

1. The Cannon-plug's lock ring was incorrectly installed by the manufacturer. Typically, it would force the prong orientation to match three unique insertion points - hot, neutral and ground. The incorrectly positioned, rotating lock-ring allowed the "ground" to be inserted into the "hot" slot (see Photo 1).
2. Internal wiring on the plug end had been cut, presumably by the set-screw that locked the top and bottom half together (see Photo 6). This resulted in the set-screw becoming an electrical conductor.

As investigators were unable to duplicate the event it is

Summary

Lesson ID:	1152
Status:	OK
Doc ID:	2021-JLAB-1152
Priority:	Caution
Safety Related:	YES
Originator:	Bailey, Mary Jo
Issued:	7/30/2021 9:17:31 AM
Approved By:	Bailey, Mary Jo
Approved On:	8/2/2021 12:26:55 PM
Source:	TJNAF NE
Location:	TJNAF
Cost Savings:	
Contact:	Ed Folts, Physics Division Safety Officer, Folts@jlab.org
Queued Emails:	357
Sent Emails:	0
Viewings:	3 times

Attachments

- [PHY-21-0721-Photo1.jpg](#)
- [PHY-21-0721-Photo2.jpg](#)
- [PHY-21-0721-Photo3.jpg](#)
- [PHY-21-0721-Photo4.jpg](#)
- [PHY-21-0721-Photo5.jpg](#)
- [PHY-21-0721-Photo6.jpg](#)

Hazard Issues

- Electricity

presumed that when the student set their hand on the on the workstation rail to steady themselves, their fingers rested against the energized metal set-screw head and when they touched the Cannon-plug they became the path to ground for the voltage.

Recommended Actions

Extent of condition check identified that there were four similar CAEN crates received since March 2020. These were examined but no defects found. The Physics Division Safety Officer is identifying and checking similar equipment received during the same time frame.

The Jefferson Lab Technical Representative notified the vendor of the two failure modes, with pictures and explanation of events.

The work group requested a Qualified Electrical Worker to modify the power cord / plug assemblies to fit their needs.

JLab Preventive Measures

See Above

Add Comment

Comments

8/2/2021 12:26:55 PM by Bailey, Mary Jo

Submitted to those current in:
SAF101: Be familiar with the concepts and practices of work planning and control
ESC001: Basic Electrical Safety (for Electrical Workers)

Skills

- SAF101: Be familiar with the concepts and practices of work planning and control
- ESC001: Basic Electrical Safety (for Electrical Workers)

Distribution/Notification

- *Division Safety Officers (DSOs)
- *Safety Wardens
- *DOE Notification
- *ESH&Q Liaisons

Fw: Student Intern: Mr. Robert[Trusten] Perkins

Steve Smith <sjsmith@jlab.org>

Thu 7/29/2021 10:32 AM

To: Ed Folts <folts@jlab.org>

Cc: Chris Cuevas <cuevas@jlab.org>; Tim Fitzgerald <tfitzger@jlab.org>

1 attachments (1 MB)

CAEN4527_2021JULY22.pdf;

Ed, can you coordinate what other Halls or PHY departments have received power cords from this vendor since March 2020, based on the link and PR numbers below? Below is a link to CAEN's purchase reqs. Need this info for the extent of condition check for the recent student shock Notable Event.

Thanks

[Search for Purchase Requisition \(jlab.org\)](#)

PR #	Description	Status	Priority	Requestor	Group	Required Date	Total Cost
404949	PETROCASICS	WAPPR-Waiting on Approval	3	Benjamin Raydo	PELECT	11/01/2021	\$6,695.20
404830	48VPS comp. for CAEN HV supp	D=Deltek - Items Ordered	2	Brad Sawatzky	PHALLC	03/31/2021	\$3,560.00
404437	Repair CAEN HV boards	D=Deltek - Items Ordered	2	Brad Sawatzky	PHALLC	07/30/2021	\$3,318.00
404351	48VPS comp. for CAEN HV supp	V=Void - Marked For Procurement	3	Brad Sawatzky	PHALLC	03/31/2021	\$4,450.00
404267	CLAS12 Reg-2 &3 WireChamber HV	D=Deltek - Items Ordered	2	Mark Taylor	PELECT	09/01/2021	\$40,902.00
404238	CAEN SY1527 CPU repair	D=Deltek - Items Ordered	2	Mark Taylor	PELECT	07/31/2021	\$1,000.00
402871	CAEN VME Power Supply	D=Deltek - Items Ordered	3	Mark Taylor	PELECT	05/03/2021	\$800.00
402718	BDX Electronic Repairs	D=Deltek - Items Ordered	3	Edon Smith	PHALLC	05/30/2021	\$1,063.50
402708	CAEN digitizer V1742	D=Deltek - Items Ordered	3	Simona Malace	PHALLA	05/05/2021	\$9,801.00
402680	CAEN amplifiers	D=Deltek - Items Ordered	3	Simona Malace	PHALLA	05/05/2021	\$1,750.00
402660	Fast amplifier	D=Deltek - Items Ordered	3	Simona Malace	PHALLA	05/05/2021	\$2,335.00
402658	Fast amplifier	D=Deltek - Items Ordered	3	Simona Malace	PHALLC	05/03/2021	\$2,335.00
400190	Hall D HV - FCAL2-Stepping	D=Deltek - Items Ordered	1	Fernando Barbosa	PHALLC	01/28/2021	\$300.00
397702	Sector 1 RCH HV and LV system	D=Deltek - Items Ordered	2	Chris Cuevas	PHALLC	03/12/2021	\$73,331.00
396843	TRANSUCERS	D=Deltek - Items Ordered	2	Onish Kumar	ESSDCP	09/11/2020	\$2,618.00
396556	NPS Radial connectors, tools	D=Deltek - Items Ordered	2	Aaron Brown	PHALLC	11/18/2020	\$20,233.00
396430	Drift Chamber HV connectors	D=Deltek - Items Ordered	2	Mark Taylor	PELECT	10/01/2020	\$13,190.42
396719	FCAL2 HV connectors	D=Deltek - Items Ordered	2	Chris Stanislav	PELECT	09/25/2020	\$31,657.00
396677	CLAS12 Reg-2 &3 WireChamber HV	D=Deltek - Items Ordered	2	Chris Cuevas	PELECT	09/25/2020	\$98,266.00
396673	CLAS12 Reg-1 Drift Chamber HV	D=Deltek - Items Ordered	2	Chris Cuevas	PHALLC	09/25/2020	\$86,604.00
396578	Hall D HV - FCAL2	D=Deltek - Items Ordered	2	Fernando Barbosa	PHALLC	10/20/2020	\$255,800.00
396367	CAEN AMS31 spares	D=Deltek - Items Ordered	3	Mark Taylor	PELECT	07/31/2020	\$6,561.00
393121	Increase for HV repair	D=Deltek - Items Ordered	3	Chris Stanislav	PELECT	03/31/2020	\$323.00
392805	Increase for PR 391321	D=Deltek - Items Ordered	3	Nicholas Sandoval	PELECT	03/09/2020	\$336.00
392630	CAEN A7236AN SN0138	D=Deltek - Items Ordered	2	Mark Taylor	PELECT	03/25/2020	\$700.00
391321	CAEN Repairs	D=Deltek - Items Ordered	3	Nicholas Sandoval	PELECT	02/12/2020	\$750.00

From: Chris Cuevas <cuevas@jlab.org>
Sent: Thursday, July 22, 2021 5:27 PM
To: Steve Smith <sjsmith@jlab.org>
Cc: Tim Fitzgerald <tfitzger@jlab.org>
Subject: Re: Student Intern: Mr. Robert[Trusten] Perkins

Hi Steve,

Please see the receiving paperwork and photos of the equipment that show the serial number and model number. The power cord is not listed as a specific line item, and I have not contacted the vendor[CAEN] to discuss manufacturing date codes or assembly lot numbers.

This particular mainframe was a single order, but we have at least four[4] more that were ordered, tested, and prepared for another detector system in Hall B during this sixteen month MEDCON4-5 period. We did not experience any type of failures for the other four units, and we do not typically inspect power cords that are delivered with this type of equipment.

Best regards,
-Chris x5053
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**From:** Steve Smith <sjsmith@jlab.org>  
**Sent:** Thursday, July 22, 2021 16:00  
**To:** Chris Cuevas <cuevas@jlab.org>  
**Cc:** Tim Fitzgerald <tfitzger@jlab.org>  
**Subject:** Fw: Student Intern: Mr. Robert[Trusten] Perkins

Hi Chris, can you tell me the date code, manufacturing lot or some type of identifier for the defective power cord? We'll need it in order to do a robust extent of condition check.

Also, do you know when the equipment was received at the Lab? And was it part of a larger shipment or just by itself?

Thanks,  
Steve

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**From:** Tina Johnson <cjohnson@jlab.org>  
**Sent:** Wednesday, July 21, 2021 3:40 PM  
**To:** Steven Hoey <hoey@jlab.org>; Bill Rainey <wrainey@jlab.org>; Steve Smith <sjsmith@jlab.org>  
**Subject:** Fwd: Student Intern: Mr. Robert[Trusten] Perkins

All,

See below. I will call Neilson in a few minutes.

Get [Outlook for iOS](#)

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**From:** Chris Cuevas <cuevas@jlab.org>  
**Sent:** Wednesday, July 21, 2021 3:35:33 PM  
**To:** Rolf Ent <ent@jlab.org>  
**Cc:** Johnnie Banks <jbanks@jlab.org>; Bert Manzlak <manzlak@jlab.org>; Mark Taylor <taylorw@jlab.org>; Tina Johnson <cjohnson@jlab.org>  
**Subject:** Student Intern: Mr. Robert[Trusten] Perkins

Rolf,

Today at approximately 14:00 while setting up a new CAEN mainframe in the EEL109 lab for initial computer checkout, Trusten received what he reports as a shock to Mark Taylor. The equipment is powered from a standard 120V cable plug that was packaged with the new mainframe.

I received a call from Mark at 14:05 and we discussed the incident and I told Mark to escort Trusten to Medical Services. There was nobody at Medical Services, so I called Johnnie Banks at 14:35 and she talked with both myself and Trusten. She agreed that Mark escort Trusten across the street to the Port Warwick Ugent Care facility and they left the site about 14:55.

Bert and I walked to the EEL109 lab about 14:20 to check on Trusten and he appeared to be well and explained what happened and how he was feeling at that moment. Mark Taylor, William Gunning and

Jeff Wilson were also present in the EEL109 lab to discuss the shock event.

What went right? Trusten immediately reported this to Mark and we acted quickly to get him to urgent care as a non-emergency precaution and to follow our training.

We applied a lockout box and label on the power cord plug and secured the cable to the equipment.

I will visit the Urgent Care Facility soon and give Trusten a ride back to JLAB to retrieve his vehicle and send another update on his status.

Regards,

-Chris

x5053

(757)269-5053 Mobile/Text

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Re: Approval Required for Notable Events

Steve Smith <sjsmith@jlab.org>

Tue 8/3/2021 10:14 AM

To: Rolf Ent <ent@jlab.org>

Cc: Chris Cuevas <cuevas@jlab.org>; Tim Fitzgerald <tfitzger@jlab.org>

Thanks, I'll also pdf and attach this email to the NE so we have all the information and discussions in one place.

Steve

From: Rolf Ent <ent@jlab.org>

Sent: Tuesday, August 3, 2021 10:13 AM

To: Steve Smith <sjsmith@jlab.org>

Cc: Chris Cuevas <cuevas@jlab.org>; Tim Fitzgerald <tfitzger@jlab.org>

Subject: Re: Approval Required for Notable Events

Okay, signed. Thanks!

From: Steve Smith <sjsmith@jlab.org>

Sent: Tuesday, August 3, 2021 10:11 AM

To: Rolf Ent <ent@jlab.org>

Cc: Chris Cuevas <cuevas@jlab.org>; Tim Fitzgerald <tfitzger@jlab.org>

Subject: Re: Approval Required for Notable Events

Tim and I discussed and we think it's covered. Our understanding is that both plug ends of the subject power cord were to be replaced by a QEW. I've noted this in the comments section of the NE (very bottom).

Steve

From: Rolf Ent <ent@jlab.org>

Sent: Tuesday, August 3, 2021 9:52 AM

To: Steve Smith <sjsmith@jlab.org>

Cc: Chris Cuevas <cuevas@jlab.org>; Tim Fitzgerald <tfitzger@jlab.org>

Subject: Re: Approval Required for Notable Events

Chris may be on travel already.

I can sign the notable event if you/Tim think it is okay and my concern is already taken care of. Just let me know. I just don't want to sign without reading, and that the ppt show and corrective actions had nothing on the plug that we think caused the problem just caught my eye.

But I am certainly not the expert, so confirm if I can sign.

Rolf

From: Steve Smith <sjsmith@jlab.org>
Sent: Tuesday, August 3, 2021 8:05 AM
To: Rolf Ent <ent@jlab.org>
Cc: Chris Cuevas <cuevas@jlab.org>; Tim Fitzgerald <tfitzger@jlab.org>
Subject: Re: Approval Required for Notable Events

My understanding is that both plug ends of the original power cord will be reworked / replaced by a QEW. Chris, pls confirm. It's in the Lesson Learned but not the NE - I can put that in the comments section of the NE though so that we have it on record.

The extent of condition check is in progress. The corrective action for that item is to remove them from service and label accordingly.

Steve

From: Rolf Ent <ent@jlab.org>
Sent: Monday, August 2, 2021 3:56 PM
To: Chris Cuevas <cuevas@jlab.org>; Steve Smith <sjsmith@jlab.org>; Tim Fitzgerald <tfitzger@jlab.org>
Subject: Re: Approval Required for Notable Events

Dear Chris,

Yes, I understand, but what I missed in the actions required was something to guarantee we will not do this in a non-isolated frame/rack anymore. There was no corrective action with what is the real cause, not? That's where I struggle,

best regards, Rolf

From: Chris Cuevas <cuevas@jlab.org>
Sent: Monday, August 2, 2021 3:49 PM
To: Rolf Ent <ent@jlab.org>; Steve Smith <sjsmith@jlab.org>; Tim Fitzgerald <tfitzger@jlab.org>
Subject: Re: Approval Required for Notable Events

Dear Rolf,

The CAEN Cannon connector cord misalignment and rotation was the real cause, and the plug cord end in this case was also assembled incorrectly.

It is speculation to say that the plug cord assembly screw was in contact with the 120V line voltage, because that was never measured. It was clear after disassembly and inspection that the wire was pinched, but the plug assembly plastic makes contact with the assembly screw nearly impossible.

It would be a very good idea to release a supplement safety flash to let people know that this type of connector/cord set has the potential to not align properly. After talking with procurement, I do not believe we can force the vendor to make a change to their product line. CAEN does offer an IEC input power connector which is impossible to misalign. However, for mainframes that require higher power, the

Cannon plug offers >15A input service capability, so that is why most of the mainframes on site have this cord set style.

One other thing to note is that the mainframe was NOT mounted in a grounded equipment rack, but was on a wooden dolly. In the Halls and Counting House locations, these mainframes are mounted in grounded racks, so IF a Cannon plug was misaligned/rotated, there are at least two over current devices that would protect personnel from a shock.

Regards,
-Chris

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**From:** Rolf Ent <ent@jlab.org>

**Sent:** Monday, August 2, 2021 15:12

**To:** Steve Smith <sjsmith@jlab.org>; Chris Cuevas <cuevas@jlab.org>; Tim Fitzgerald <tfitzger@jlab.org>

**Subject:** Re: Approval Required for Notable Events

Dear Steve, Tim, Chris,

before I sign, I have one question. It is not clear to me what we will concretely do to ensure these cannon plugs can not go in rotated anymore. Are we changing the slot and groove or so? The ppt seems to also only point to the earlier issue. Shouldn't we add something to point to the rotation issue that may have been the real cause, if I understand it right? So not sure how we attack this. Please elucidate a bit for me before I sign.

Best regards, Rolf

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**From:** sjsmith@jlab.org <sjsmith@jlab.org>

**Sent:** Monday, August 2, 2021 2:54 PM

**To:** Rolf Ent <ent@jlab.org>

**Subject:** Approval Required for Notable Events

-DO NOT REPLY TO THIS EMAIL-

A Notable Events has been submitted for signatures and you are authorized to complete at least one part of the signature process.

Signature Required: Associate Director / Department Manager signature

You may track the approval progress for this Notable Events and possibly sign/reject this required signature here:

[https://misportal.jlab.org/railsForms/notable\\_events/default?ENTRY\\_ID=118643&approvalVersion=1](https://misportal.jlab.org/railsForms/notable_events/default?ENTRY_ID=118643&approvalVersion=1)

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To configure which approval emails you receive, please visit:

[https://misportal.jlab.org/approvalsManager/notification\\_preferences](https://misportal.jlab.org/approvalsManager/notification_preferences)

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ATTENDEES[0][INVESTIGATION\_TEAM] = 1

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CAN\_VIEW\_PERSON[1] = 21287  
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CAN\_VIEW\_PERSON[3] = 357593  
CAN\_VIEW\_PERSON[4] = 364461  
CATEGORY = 8  
CFR\_DATE = 07/23/2021  
CFR\_TIME = 06:34 am  
CHRONOLOGY\_COMP = Yes  
CLARIFY\_INFO\_COMP = Yes  
COMPENSATORY\_COMP = No

CONDITIONS\_COMP = Yes

CONTRACT\_REQUIREMENTS[0][REQ\_ID] = 10333

CONTRACT\_REQUIREMENTS[0][REQ\_NAME] = 10 CFR 851 Worker Safety and Health Program

DATE\_OF\_OCCURRENCE = 07/21/2021

DATE\_SAVED = 2021-08-02 14:01:05.0

DATE\_SUBMITTED = 2021-08-02 14:01:05.0

DETAIL\_OF\_EVENT = While attempting to energize a new CAEN crate, a student received two 120V shocks while in contact with both the crate and a metal desk supplying power. Both shocks were due to a compromised cannon plug, as received from the vendor. The cannon plug failure mode was discovered after the ORPS entry and initial safety flash email. This compromised cannon plug allowed for the "hot" prong to be inserted into the "ground" slot and thus energized the crate assembly. The plug design has a combination alignment key and lock ring that forces the plug insertion orientation to match up with three points - hot, neutral and ground. However, in this case, the lock ring was incorrectly able to rotate independently, enabling the "hot" prong to be inserted into the "ground" slot and energizing the crate. The insertion configuration was successfully re-created. A related failure mode on the male plug involved contact between a screw shank with an externally exposed head and bare metal conductors. The screw had stripped these bare metal conductors of their insulation during manufacturer assembly, allowing for direct contact with a person's hand during plug in. This would also not have been visible to the user. As the investigation developed, this failure mode was ruled out as the direct cause in accordance with witness and supervisor discussions. The compromised cord and plug assembly were as-received from the manufacturer new/in the box; They are CE rated. The sequence of events follows. The student: ? attached the cannon plug end of the power cord to the crate, ? plugged the cord into an electrical socket on the metal desk ? activated the crate's power button ? plugged in the Ethernet connection ? noted that the crate was not properly communicating with his workstation ? adjusted the power cord while using his other hand to stabilize himself with the metal desk railing ? experienced a shock ? unplugged the Ethernet ? brushed another part of the CAEN crate with his hand while unplugging the Ethernet ? experienced another shock The student promptly notified Mark Taylor, who was also working in the space. The student then called the supervisor, Chris Cuevas, who instructed them to go to OCCMED immediately. Mark escorted the student to OCCMED, which, due to MEDCON 4, did not have personnel onsite. Mark called the posted OCCMED number, received no answer, and went back to the EEL building to meet the student's supervisor to discuss the situation. By this time, the cable and CAEN crate had been locked out. It should be noted that OCCMED has provided multiple alternate contact numbers since the start of this Notable Event, and made this information broadly available. Pls see attached objective evidence. While in the EEL building, they called OCCMED again and were directed to go to Port Warwick Urgent Care (note: per OCCMED, referral is the normal process for this type of event, regardless of MEDCON status). Mark drove the student to Port Warwick, where he was evaluated and released with no restrictions. Extent of condition checks revealed one similar setup in EEL 109, which was evaluated and found to be in compliance. There are 4 other CAEN crate / power cord received in Hall B since March 2020 that will be checked as part of the Extent of Condition. Additionally, any other power cords with similar plug configurations will be checked; this will be coordinated by the Physics DSO. FAR 52.212-04 Implied Warranty of Merchantability, was reviewed for recourse with the vendor. Although it is applicable and JSA has an established process, Procurement will not apply it in this situation, as JSA intends to keep and modify the power cord / plug assemblies to fit their needs and not return it. Existing NE-2019-05-12-06 addresses JSA's response to OSHA's recently implemented non acceptance of CE ratings. This is an ORPS (high) reportable event, number SC--TJSO-JSA-TJNAF-2021-0002.

DOE\_CAUSE\_CODE = A2 B6 C1

DUE\_DATE = 08/19/2021

DUE\_TIME = 02:15 pm



ENTRY\_ID = 118643  
ENVIRONMENTAL\_NA = 1  
ESH\_EMERGENCY\_DATE = 07/21/2021  
ESH\_EMERGENCY\_TIME = 03:35 pm  
EVENT\_LOCATION = 90\_1.109  
EVENT\_RECONSTRUCTION\_COMP = Yes  
EVENT\_TITLE = PHY-21-0721-Student Receives two 120V shocks - No injury  
EXPIRATION\_DATE =  
EXTENT\_CHECK\_V2[CORRECTIVE\_ACTIONS][0][ACTION\_TARGET\_DATE] = 08/31/2021  
EXTENT\_CHECK\_V2[CORRECTIVE\_ACTIONS][0][ACTION\_TEXT] = Review EEL109 and Hall B / counting house for the four assemblies that came in during MEDCON 4/5. Ensure that the plug ends do not have the same two failure modes. If they do, remove from service and label appropriately. Evidence of Completion: documentation of results. If failures are found, pictures indicating removal from service.  
EXTENT\_CHECK\_V2[CORRECTIVE\_ACTIONS][0][CORRECTIVE\_ACTION\_OWNERS][0] = 11385  
EXTENT\_CHECK\_V2[CORRECTIVE\_ACTIONS][1][ACTION\_TARGET\_DATE] = 08/31/2021  
EXTENT\_CHECK\_V2[CORRECTIVE\_ACTIONS][1][ACTION\_TEXT] = Identify all power cord / cannon plug receipts from CAEN technologies since March 2020. Use the provided Purchase Req list. Check them all to ensure that the plug ends do not have the same two failure modes. If they do, remove from service and label appropriately. Evidence of Completion: documentation of results. If failures are found, pictures indicating removal from service.  
EXTENT\_CHECK\_V2[CORRECTIVE\_ACTIONS][1][CORRECTIVE\_ACTION\_OWNERS][0] = 11431  
EXTENT\_CHECK\_V2[EXTENT\_CHECK\_NA] = 0  
EXTENT\_CHECK\_V2[EXTERNAL\_REPORT] = 1  
EXTENT\_CHECK\_V2[EXTERNAL\_REPORT\_NUM] = SC--TJSO-JSA-TJNAF-2021-0002  
EXTENT\_CHECK\_V2[EXTERNAL\_REPORT\_SIGNIFICANCE] = High  
EXTENT\_CHECK\_V2[EXTERNAL\_REPORT\_TYPE] = ORPS  
EXTENT\_CHECK\_V2[FAILED\_EQUIPMENT] = YES  
EXTENT\_CHECK\_V2[SIGNIFICANCE\_LEVEL] = 3  
EXTENT\_CHECK\_V2[SIMILAR\_EQUIPMENT] = YES  
EXTENT\_CHECK\_V2[TEXT] = Review PHY receipts of similar power cord / plug assemblies received from CAEN Technologies since March 2020 for the same two failure modes. If present, remove from service and label appropriately.  
FORM\_CATEGORY = Safety  
FORM\_CODE =  
FORM\_DESCRIPTION = Notable Events  
FORM\_ID = 234  
FORM\_NAME = Notable Events  
FORM\_NOTIFICATION\_EMAIL =  
FORM\_URL = [https://misportal.jlab.org/railsForms/notable\\_events/default](https://misportal.jlab.org/railsForms/notable_events/default)  
FORM\_VERSION = 2.2.1  
IFF\_MEETING\_COMP = Yes  
IMMEDIATE\_ACTIONS\_COMP = Yes  
IMMEDIATE\_CORRECTIVE\_ACTIONS = The defective power cord and crate were tagged out. A similar setup in EEL 109 was reviewed for the same failure mode, with negative results.  
IMPACT\_SOIL = 0  
INTRODUCTION\_COMP = Yes  
ISM\_CODE = Provide Feedback and Continuous Improvement  
ISSUE\_OWNER = 21287  
JONS[0][CORRECTIVE\_ACTIONS][0][ACTION\_TARGET\_DATE] = 08/31/2021

JONS[0][CORRECTIVE\_ACTIONS][0][ACTION\_TEXT] = Technical Representative to notify the vendor of the two failure modes, with pictures and explanation of events. Evidence of completion: snapshot or copy of email sent. Vendor confirmation of receipt if available.

JONS[0][CORRECTIVE\_ACTIONS][0][CORRECTIVE\_ACTION\_OWNERS][0] = 11385

JONS[0][DOE\_CAUSE\_A] = 123

JONS[0][DOE\_CAUSE\_B] = 139

JONS[0][DOE\_CAUSE\_C] = 203

JONS[0][EXTERNAL\_REPORT] = 0

JONS[0][ROOT\_CAUSES][0][TEXT] = The manufacturer shipped a compromised power cord and plug assembly to JSA.

JONS[0][SIGNIFICANCE\_LEVEL] = 1

JONS[0][TEXT] = Vendor notification of as-received defective plug/power cord.

LEARNED\_NUM = 1152

LESSONS\_LEARNED[0][LEARNED\_NUM] = 1152

LESSONS\_LEARNED[0][LEARNED\_TEXT] = <https://misportal.jlab.org/ll/index.jsf?function=print&lessonId=1152> PHY-21-0721 Student Receives Two 120V Electric Shocks

MEDICAL\_EMERGENCY\_DATE = 07/21/2021

MEDICAL\_EMERGENCY\_TIME = 02:35 pm

MEETING\_DATE = 07/22/2021

MEETING\_LOCATION = virtual

MEETING\_TIME = 11:00 am

NE\_NUMBER = PHY-21-0721

ORPS\_DATE = 07/23/2021

ORPS\_DETERMINATION = Subgroup D Hazardous Energy. # RL Criterion (1) H Any unexpected or unintended personal contact (e.g., burn, shock, injury, etc.) with a hazardous energy source (e.g., live electrical power circuit, mechanical hazards, steam, pressurized gas, etc.). SC--TJSO-JSA-TJNAF-2021-0002

ORPS\_NUM = SC--TJSO-JSA-TJNAF-2021-0002

ORPS\_TIME = 06:34 am

OTHER\_EMERGENCY\_DATE = 07/21/2021

OTHER\_EMERGENCY\_NUM = Supervisor

OTHER\_EMERGENCY\_TIME = 02:35 pm

PERSONNEL\_INVOLVED\_COMP = Yes

PREV\_ENTRY\_ID = 0

PREV\_STATUS = SAVE

QUESTIONS\_COMP = Yes

RECORDS = see attached PPT for pictures

RECORDS\_COMP = Yes

REPORTABLE\_QUANTITY = 0

SANITARY\_SEWER = 0

STATUS = WAPPR

STOP\_WORK\_COMP = No

STORM\_WATER = 0

SUBMITTED\_BY = {ORG\_ID=1.CO.001.0007.01, COMP\_ID=295930, USERNAME=sjsmith, ORG\_ABRV=PERFAS, NAME=Smith, Steve}

SUBMITTED\_BY\_COMP\_ID = 295930

SUBMITTED\_FOR = {ORG\_ID=1.CO.001.0007.01, COMP\_ID=295930, USERNAME=sjsmith, ORG\_ABRV=PERFAS, NAME=Smith, Steve}

SUBMITTED\_FOR\_COMP\_ID = 295930



SUMMARY\_OF\_EVENT = A student received two 120V shocks when using an as-received power cord and plug assembly. The assembly had two failure modes, both involving the separate plug ends, i.e., one on the male cord plug end, and one on the cannon plug connector end that mates with the CAEN equipment. Both shocks were a result of the compromised cannon plug. Failure mode 1 involves the presence of an externally exposed metal screw that, during manufacturer assembly, had stripped wire insulation and was thus in contact with bare wire. Failure mode 2 was due to a compromised cannon plug (i.e., the plug that goes into the CAEN crate) that allowed for the "hot" prong to be mistakenly plugged into the ground receptacle.

TEAM\_DATE\_CONVENED = 07/22/2021

TIME\_OF\_OCCURRENCE = 02:15 pm

TJSO\_COMP = Yes

## Re: Approval Required for Notable Events

Chris Cuevas <cuevas@jlab.org>

Tue 8/3/2021 10:30 AM

To: Rolf Ent <ent@jlab.org>; Steve Smith <sjsmith@jlab.org>

Cc: Tim Fitzgerald <tfitzger@jlab.org>

Not on travel yet and it looks like Thurs to next Tues will be best to align with my Mother-in-law's funeral arrangements.

I see that your signed and we will replace both ends of the power cord that caused this accident.

This type of equipment is perfectly safe without mounting in a grounded equipment rack and if we go down this path, then every piece of Class II equipment will fall into this category. The corrective action to inspect the most recently purchased 'crates' is the first step and we are planning to check crates in the hall. The hall equipment racks are definitely grounded per NEC code, and most [if not all] of the crates are powered on and running so there are no issues with established installations.

We will definitely inspect all new incoming equipment with this style of mains input connector, and I will emphasize with the Technicians that install these to double check the alignment of these Cannon style connectors prior to plugging into the power receptacle, and add a procedure step to verify continuity from the chassis to the ground plug pin before attaching to the power receptacle.

The PowerPoint slides covered the first discovery and the 'smoking gun' at that point was the little screw keeping the plug housing together. We know now that the Cannon connector was the culprit and the alignment did not work properly.

Regards,

-Chris

~~~~~

From: Rolf Ent <ent@jlab.org>

Sent: Tuesday, August 3, 2021 09:52

To: Steve Smith <sjsmith@jlab.org>

Cc: Chris Cuevas <cuevas@jlab.org>; Tim Fitzgerald <tfitzger@jlab.org>

Subject: Re: Approval Required for Notable Events

Chris may be on travel already.

I can sign the notable event if you/Tim think it is okay and my concern is already taken care of. Just let me know. I just don't want to sign without reading, and that the ppt show and corrective actions had nothing on the plug that we think caused the problem just caught my eye.

But I am certainly not the expert, so confirm if I can sign.

Rolf

From: Steve Smith <sjsmith@jlab.org>

Sent: Tuesday, August 3, 2021 8:05 AM

To: Rolf Ent <ent@jlab.org>

Cc: Chris Cuevas <cuevas@jlab.org>; Tim Fitzgerald <tfitzger@jlab.org>

Subject: Re: Approval Required for Notable Events

My understanding is that both plug ends of the original power cord will be reworked / replaced by a QEW. Chris, pls confirm. It's in the Lesson Learned but not the NE - I can put that in the comments section of the NE though so that we have it on record.

The extent of condition check is in progress. The corrective action for that item is to remove them from service and label accordingly.

Steve

From: Rolf Ent <ent@jlab.org>
Sent: Monday, August 2, 2021 3:56 PM
To: Chris Cuevas <cuevas@jlab.org>; Steve Smith <sjsmith@jlab.org>; Tim Fitzgerald <tfitzger@jlab.org>
Subject: Re: Approval Required for Notable Events

Dear Chris,

Yes, I understand, but what I missed in the actions required was something to guarantee we will not do this in a non-isolated frame/rack anymore. There was no corrective action with what is the real cause, not? That's where I struggle,

best regards, Rolf

From: Chris Cuevas <cuevas@jlab.org>
Sent: Monday, August 2, 2021 3:49 PM
To: Rolf Ent <ent@jlab.org>; Steve Smith <sjsmith@jlab.org>; Tim Fitzgerald <tfitzger@jlab.org>
Subject: Re: Approval Required for Notable Events

Dear Rolf,

The CAEN Cannon connector cord misalignment and rotation was the real cause, and the plug cord end in this case was also assembled incorrectly.

It is speculation to say that the plug cord assembly screw was in contact with the 120V line voltage, because that was never measured. It was clear after disassembly and inspection that the wire was pinched, but the plug assembly plastic makes contact with the assembly screw nearly impossible.

It would be a very good idea to release a supplement safety flash to let people know that this type of connector/cord set has the potential to not align properly. After talking with procurement, I do not believe we can force the vendor to make a change to their product line. CAEN does offer an IEC input power connector which is impossible to misalign. However, for mainframes that require higher power, the Cannon plug offers >15A input service capability, so that is why most of the mainframes on site have this cord set style.

One other thing to note is that the mainframe was NOT mounted in a grounded equipment rack, but was on a wooden dolly. In the Halls and Counting House locations, these mainframes are mounted in grounded racks, so IF a Cannon plug was misaligned/rotated, there are at least two over current devices that would protect personnel from a shock.

Regards,
-Chris

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**From:** Rolf Ent <ent@jlab.org>  
**Sent:** Monday, August 2, 2021 15:12  
**To:** Steve Smith <sjsmith@jlab.org>; Chris Cuevas <cuevas@jlab.org>; Tim Fitzgerald <tfitzger@jlab.org>  
**Subject:** Re: Approval Required for Notable Events

Dear Steve, Tim, Chris,

before I sign, I have one question. It is not clear to me what we will concretely do to ensure these cannon plugs can not go in rotated anymore. Are we changing the slot and groove or so? The ppt seems to also only point to the earlier issue. Shouldn't we add something to point to the rotation issue that may have been the real cause, if I understand it right? So not sure how we attack this. Please elucidate a bit for me before I sign.

Best regards, Rolf

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**From:** sjsmith@jlab.org <sjsmith@jlab.org>  
**Sent:** Monday, August 2, 2021 2:54 PM  
**To:** Rolf Ent <ent@jlab.org>  
**Subject:** Approval Required for Notable Events

-DO NOT REPLY TO THIS EMAIL-

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ATTENDEES[8][FACT\_FINDING] = 1  
ATTENDEES[8][GROUP] = DOE  
ATTENDEES[8][INVESTIGATION\_TEAM] = 0  
ATTENDEES[8][NOTIFIED] = 0  
ATTENDEES[8][PHONE] = 7215  
ATTENDEES[8][ROLE] = TJSO Observer  
ATTENDEES[9][ATTENDEE] = 250899  
ATTENDEES[9][FACT\_FINDING] = 1  
ATTENDEES[9][GROUP] = OM  
ATTENDEES[9][INVESTIGATION\_TEAM] = 0  
ATTENDEES[9][NOTIFIED] = 0  
ATTENDEES[9][PHONE] = 7539  
ATTENDEES[9][ROLE] = Other  
CAN\_EDIT\_PERSON[0] = 249252  
CAN\_VIEW\_PERSON[0] = 11445  
CAN\_VIEW\_PERSON[1] = 21287  
CAN\_VIEW\_PERSON[2] = 48544  
CAN\_VIEW\_PERSON[3] = 357593  
CAN\_VIEW\_PERSON[4] = 364461  
CATEGORY = 8  
CFR\_DATE = 07/23/2021  
CFR\_TIME = 06:34 am  
CHRONOLOGY\_COMP = Yes  
CLARIFY\_INFO\_COMP = Yes  
COMPENSATORY\_COMP = No  
CONDITIONS\_COMP = Yes  
CONTRACT\_REQUIREMENTS[0][REQ\_ID] = 10333  
CONTRACT\_REQUIREMENTS[0][REQ\_NAME] = 10 CFR 851 Worker Safety and Health Program  
DATE\_OF\_OCCURRENCE = 07/21/2021  
DATE\_SAVED = 2021-08-02 14:01:05.0  
DATE\_SUBMITTED = 2021-08-02 14:01:05.0  
DETAIL\_OF\_EVENT = While attempting to energize a new CAEN crate, a student received two 120V shocks while in contact with both the crate and a metal desk supplying power. Both shocks were due to a compromised cannon plug, as received from the vendor. The cannon plug failure mode was

discovered after the ORPS entry and initial safety flash email. This compromised cannon plug allowed for the "hot" prong to be inserted into the "ground" slot and thus energized the crate assembly. The plug design has a combination alignment key and lock ring that forces the plug insertion orientation to match up with three points - hot, neutral and ground. However, in this case, the lock ring was incorrectly able to rotate independently, enabling the "hot" prong to be inserted into the "ground" slot and energizing the crate. The insertion configuration was successfully re-created. A related failure mode on the male plug involved contact between a screw shank with an externally exposed head and bare metal conductors. The screw had stripped these bare metal conductors of their insulation during manufacturer assembly, allowing for direct contact with a person's hand during plug in. This would also not have been visible to the user. As the investigation developed, this failure mode was ruled out as the direct cause in accordance with witness and supervisor discussions. The compromised cord and plug assembly were as-received from the manufacturer new/in the box; They are CE rated. The sequence of events follows. The student: ? attached the cannon plug end of the power cord to the crate, ? plugged the cord into an electrical socket on the metal desk ? activated the crate's power button ? plugged in the Ethernet connection ? noted that the crate was not properly communicating with his workstation ? adjusted the power cord while using his other hand to stabilize himself with the metal desk railing ? experienced a shock ? unplugged the Ethernet ? brushed another part of the CAEN crate with his hand while unplugging the Ethernet ? experienced another shock The student promptly notified Mark Taylor, who was also working in the space. The student then called the supervisor, Chris Cuevas, who instructed them to go to OCCMED immediately. Mark escorted the student to OCCMED, which, due to MEDCON 4, did not have personnel onsite. Mark called the posted OCCMED number, received no answer, and went back to the EEL building to meet the student's supervisor to discuss the situation. By this time, the cable and CAEN crate had been locked out. It should be noted that OCCMED has provided multiple alternate contact numbers since the start of this Notable Event, and made this information broadly available. Pls see attached objective evidence. While in the EEL building, they called OCCMED again and were directed to go to Port Warwick Urgent Care (note: per OCCMED, referral is the normal process for this type of event, regardless of MEDCON status). Mark drove the student to Port Warwick, where he was evaluated and released with no restrictions. Extent of condition checks revealed one similar setup in EEL 109, which was evaluated and found to be in compliance. There are 4 other CAEN crate / power cord received in Hall B since March 2020 that will be checked as part of the Extent of Condition. Additionally, any other power cords with similar plug configurations will be checked; this will be coordinated by the Physics DSO. FAR 52.212-04 Implied Warranty of Merchantability, was reviewed for recourse with the vendor. Although it is applicable and JSA has an established process, Procurement will not apply it in this situation, as JSA intends to keep and modify the power cord / plug assemblies to fit their needs and not return it. Existing NE-2019-05-12-06 addresses JSA's response to OSHA's recently implemented non acceptance of CE ratings. This is an ORPS (high) reportable event, number SC--TJSO-JSA-TJNAF-2021-0002.

DOE\_CAUSE\_CODE = A2 B6 C1

DUE\_DATE = 08/19/2021

DUE\_TIME = 02:15 pm

ENTRY\_ID = 118643

ENVIRONMENTAL\_NA = 1

ESH\_EMERGENCY\_DATE = 07/21/2021

ESH\_EMERGENCY\_TIME = 03:35 pm

EVENT\_LOCATION = 90\_1.109

EVENT\_RECONSTRUCTION\_COMP = Yes

EVENT\_TITLE = PHY-21-0721-Student Receives two 120V shocks - No injury

EXPIRATION\_DATE =

EXTENT\_CHECK\_V2[CORRECTIVE\_ACTIONS][0][ACTION\_TARGET\_DATE] = 08/31/2021

EXTENT\_CHECK\_V2[CORRECTIVE\_ACTIONS][0][ACTION\_TEXT] = Review EEL109 and Hall B / counting house for the four assemblies that came in during MEDCON 4/5. Ensure that the plug ends do not have the same two failure modes. If they do, remove from service and label appropriately. Evidence of Completion: documentation of results. If failures are found, pictures indicating removal from service.

EXTENT\_CHECK\_V2[CORRECTIVE\_ACTIONS][0][CORRECTIVE\_ACTION\_OWNERS][0] = 11385

EXTENT\_CHECK\_V2[CORRECTIVE\_ACTIONS][1][ACTION\_TARGET\_DATE] = 08/31/2021

EXTENT\_CHECK\_V2[CORRECTIVE\_ACTIONS][1][ACTION\_TEXT] = Identify all power cord / cannon plug receipts from CAEN technologies since March 2020. Use the provided Purchase Req list. Check them all to ensure that the plug ends do not have the same two failure modes. If they do, remove from service and label appropriately. Evidence of Completion: documentation of results. If failures are found, pictures indicating removal from service.

EXTENT\_CHECK\_V2[CORRECTIVE\_ACTIONS][1][CORRECTIVE\_ACTION\_OWNERS][0] = 11431

EXTENT\_CHECK\_V2[EXTENT\_CHECK\_NA] = 0

EXTENT\_CHECK\_V2[EXTERNAL\_REPORT] = 1

EXTENT\_CHECK\_V2[EXTERNAL\_REPORT\_NUM] = SC--TJSO-JSA-TJNAF-2021-0002

EXTENT\_CHECK\_V2[EXTERNAL\_REPORT\_SIGNIFICANCE] = High

EXTENT\_CHECK\_V2[EXTERNAL\_REPORT\_TYPE] = ORPS

EXTENT\_CHECK\_V2[FAILED\_EQUIPMENT] = YES

EXTENT\_CHECK\_V2[SIGNIFICANCE\_LEVEL] = 3

EXTENT\_CHECK\_V2[SIMILAR\_EQUIPMENT] = YES

EXTENT\_CHECK\_V2[TEXT] = Review PHY receipts of similar power cord / plug assemblies received from CAEN Technologies since March 2020 for the same two failure modes. If present, remove from service and label appropriately.

FORM\_CATEGORY = Safety

FORM\_CODE =

FORM\_DESCRIPTION = Notable Events

FORM\_ID = 234

FORM\_NAME = Notable Events

FORM\_NOTIFICATION\_EMAIL =

FORM\_URL = [https://misportal.jlab.org/railsForms/notable\\_events/default](https://misportal.jlab.org/railsForms/notable_events/default)

FORM\_VERSION = 2.2.1

IFF\_MEETING\_COMP = Yes

IMMEDIATE\_ACTIONS\_COMP = Yes

IMMEDIATE\_CORRECTIVE\_ACTIONS = The defective power cord and crate were tagged out. A similar setup in EEL 109 was reviewed for the same failure mode, with negative results.

IMPACT\_SOIL = 0

INTRODUCTION\_COMP = Yes

ISM\_CODE = Provide Feedback and Continuous Improvement

ISSUE\_OWNER = 21287

JONS[0][CORRECTIVE\_ACTIONS][0][ACTION\_TARGET\_DATE] = 08/31/2021

JONS[0][CORRECTIVE\_ACTIONS][0][ACTION\_TEXT] = Technical Representative to notify the vendor of the two failure modes, with pictures and explanation of events. Evidence of completion: snapshot or copy of email sent. Vendor confirmation of receipt if available.

JONS[0][CORRECTIVE\_ACTIONS][0][CORRECTIVE\_ACTION\_OWNERS][0] = 11385

JONS[0][DOE\_CAUSE\_A] = 123

JONS[0][DOE\_CAUSE\_B] = 139

JONS[0][DOE\_CAUSE\_C] = 203

JONS[0][EXTERNAL\_REPORT] = 0

JONS[0][ROOT\_CAUSES][0][TEXT] = The manufacturer shipped a compromised power cord and plug



assembly to JSA.

JONS[0][SIGNIFICANCE\_LEVEL] = 1

JONS[0][TEXT] = Vendor notification of as-received defective plug/power cord.

LEARNED\_NUM = 1152

LESSONS\_LEARNED[0][LEARNED\_NUM] = 1152

LESSONS\_LEARNED[0][LEARNED\_TEXT] = [https://misportal.jlab.org/ll/index.jsf?](https://misportal.jlab.org/ll/index.jsf?function=print&lessonId=1152)

[function=print&lessonId=1152](https://misportal.jlab.org/ll/index.jsf?function=print&lessonId=1152) PHY-21-0721 Student Receives Two 120V Electric Shocks

MEDICAL\_EMERGENCY\_DATE = 07/21/2021

MEDICAL\_EMERGENCY\_TIME = 02:35 pm

MEETING\_DATE = 07/22/2021

MEETING\_LOCATION = virtual

MEETING\_TIME = 11:00 am

NE\_NUMBER = PHY-21-0721

ORPS\_DATE = 07/23/2021

ORPS\_DETERMINATION = Subgroup D Hazardous Energy. # RL Criterion (1) H Any unexpected or unintended personal contact (e.g., burn, shock, injury, etc.) with a hazardous energy source (e.g., live electrical power circuit, mechanical hazards, steam, pressurized gas, etc.). SC--TJSO-JSA-TJNAF-2021-0002

ORPS\_NUM = SC--TJSO-JSA-TJNAF-2021-0002

ORPS\_TIME = 06:34 am

OTHER\_EMERGENCY\_DATE = 07/21/2021

OTHER\_EMERGENCY\_NUM = Supervisor

OTHER\_EMERGENCY\_TIME = 02:35 pm

PERSONNEL\_INVOLVED\_COMP = Yes

PREV\_ENTRY\_ID = 0

PREV\_STATUS = SAVE

QUESTIONS\_COMP = Yes

RECORDS = see attached PPT for pictures

RECORDS\_COMP = Yes

REPORTABLE\_QUANTITY = 0

SANITARY\_SEWER = 0

STATUS = WAPPR

STOP\_WORK\_COMP = No

STORM\_WATER = 0

SUBMITTED\_BY = {ORG\_ID=1.CO.001.0007.01, COMP\_ID=295930, USERNAME=sjsmith,

ORG\_ABRV=PERFAS, NAME=Smith, Steve}

SUBMITTED\_BY\_COMP\_ID = 295930

SUBMITTED\_FOR = {ORG\_ID=1.CO.001.0007.01, COMP\_ID=295930, USERNAME=sjsmith,

ORG\_ABRV=PERFAS, NAME=Smith, Steve}

SUBMITTED\_FOR\_COMP\_ID = 295930

SUMMARY\_OF\_EVENT = A student received two 120V shocks when using an as-received power cord and plug assembly. The assembly had two failure modes, both involving the separate plug ends, i.e., one on the male cord plug end, and one on the cannon plug connector end that mates with the CAEN equipment. Both shocks were a result of the compromised cannon plug. Failure mode 1 involves the presence of an externally exposed metal screw that, during manufacturer assembly, had stripped wire insulation and was thus in contact with bare wire. Failure mode 2 was due to a compromised cannon plug (i.e., the plug that goes into the CAEN crate) that allowed for the "hot" prong to be mistakenly plugged into the ground receptacle.

TEAM\_DATE\_CONVENED = 07/22/2021