

**From:** Robert Hagg WHOI/Tech Pool  
**Date:** March 19, 2014 4:28:55 AM MDT  
**To:** RVTEC@mail.unols.org  
**Subject:** [RVTEC] Policies on deploying CTD while powered up

I was wondering what the general consensus is on deploying & recovering the CTD while powered up? I realize some Institutions may have practiced this decades ago, but I'm not familiar with the general policies on doing this now.

There are some systems that require this practice, Fast Tow VPR, ROVs and insulating gloves are required to deploy in this fashion.

I have a science party that feels it is much too inconvenient to power up on deck, record pressure then power down and deploy. I was told "Other ships allow us to do it", on a number of occasions for different things and wondered if this is indeed the case.

If this is not a standard procedure, can we add that powering equipment on deck without proper safety equipment will not be allowed in the IMS manual or UNOLS Safety manual. It would avoid feeling like we're overly cautious.

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Robert Hagg

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**From:** Marshall Swartz/WHOI  
**Date:** March 19, 2014 5:09:25 AM MDT  
**Subject:** [RVTEC] Re: [Ctd] Policies on deploying CTD while powered up

Robb,

If the scientists don't want the assurance of recording the on-deck pressure to check for bias- the first indication of pressure channel problems- then let them do it.

Startup on-deck is not stated as a must-do by SeaBird, but having the operational verification before and during entering the water has been very useful to me.

Speaking as one who has on two occasions been holding a rosette frame with my bare hands and wet boots when it was at +280V potential- the old FSI EMCTD days- I know personally the value of providing an assured grounding mechanism.

As long as the rosette is properly protected by use of a secure mechanical and electrical bond to the seacable ground return between the rosette frame and the seacable armor, there is a reliable assurance that the frame is at ground potential and not an issue.

After providing such assurance, if someone has particular concerns, I'd like to hear the reasoning to know how this may be done better.

Marshall

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**From:** Robert Hagg WHOI/Tech Pool  
**Date:** March 19, 2014 5:14:02 AM MDT

Roger that. That is exactly my thought.

I've been deploying them for 17 years within the UNOLS fleet and never came across this. I agree that on occasion we forget to power down the SBE11, but that's not intentional. I also agree that I never felt it an extreme risk. I also agree that we commonly do a quick deck test to verify sensors, and power back down. When we do so, we warn everyone that we are powering up the CTD just as a matter of habit.

I was specifically told that NOAA allows, the intentional deployment and recover of a powered up CTD. I agree with your procedure, however I was told this was too inconvenient for them, although they begrudgingly agreed to go ahead and power on deck, take readings then power off.

Just so I understand, You are saying that NOAA does not as a matter of practice allow the CTD to be deployed and recovered with the power on? But of course at zero dark 30 sometimes we forget. Is that correct?

It would help if our ISM procedures safe deployment simply stated the accepted procedure, and if energized equipment is to be deployed, proper safety gloves will be worn. Having discussions on why things we did for 30 years is no longer allowed is a hard thing to justify. This applies to the Appendix A & B as well.

The following procedure you wrote was too inconvenient.

""....simply turn on the deck unit, start a new file, verify that deck numbers look realistic, press a button on an excel spread sheet or a snag it.... and stop the file, power down, and go deploy....this way one can do a quick check before bothering to put it in the

water....then at the end of the cast, close the file, power down the deck unit, and go pick up....it's just good general practice..."

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**From:** Robert Hagg WHOI/Tech Pool  
**Date:** March 19, 2014 5:18:19 AM MDT

Roger that. Thank you Marshall for the quick response.

It's not the powering up on deck to check pressure, then power down to deploy that is the issue.

They want to power up on deck, and leave it powered up during deployment and recovery, and stated that other UNOLS boats and NOAA allow them to do it as a matter of routine.

r

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**From:** Robert Hagg WHOI/Tech Pool  
**Date:** March 19, 2014 6:21:20 AM MDT

Marshall,

I wanted to be sure I understand your response. I read this to mean that as long as the seacable ground (armor) is secure electrically and mechanically to the Rosette Cage, there is reliable assurance that the frame is at ground potential, and we can deploy and recover the energized (powered up) CTD with relatively little concern of being shocked.

So it should not be a problem to deploy/recover a powered up cage without protective gloves?

r

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**From:** Jim Newman/WHMSI  
**Date:** March 19, 2014 6:30:45 AM MDT

"Relatively little concern of being shocked" sound right, but hardly adequate.

I applaud the attempt to tie the CTD frame to ship's potential, but it can't be assumed that that connection might not fail, particularly given the difficulty of maintaining connections in a seawater environment. You should use lineman's insulating gloves when handling a device

that's powered up with potentially lethal voltages (certainly anything above 48 volts), regardless of isolation and/or grounding.

-- Jim

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**From:** Molly Baringer - NOAA Federal  
**Date:** March 19, 2014 6:21:09 AM MDT

Hi Robert,

I work routinely on NOAA vessels (and many UNOLS vessels) and I would say that most (say 70%) allow the CTD to be powered up throughout deployment and recovery. I believe this is justified by Marshall's comment:

"As long as the rosette is properly protected by use of a secure mechanical and electrical bond to the seacable ground return between the rosette frame and the seacable armor, there is a reliable assurance that the frame is at ground potential and not an issue."

NOAA typically has their ET assure that all electrical connections are properly made.

-Molly

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**From:** Robert Hagg /WHOI/Tech Pool  
**Date:** March 19, 2014 6:32:16 AM MDT

Thank you for the clarification.

I have had ground go bad on a number of occasions but have always powered down the cage before recovery, with the exception of those times where we forget by mistake.

I did not want to be unduly cautious and change their routine if there wasn't sound reason to do so. I never intentionally deployed a CTD powered up, and wasn't sure if that was standard or not.

Regards,

R

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**From:** Robert Hagg WHOI/Tech Pool  
**Date:** March 19, 2014 6:32:16 AM MDT

Thank you for the clarification.

I have had ground go bad on a number of occasions but have always powered down the cage before recovery, with the exception of those times where we forget by mistake.

I did not want to be unduly cautious and change their routine if there wasn't sound reason to do so. I never intentionally deployed a CTD powered up, and wasn't sure if that was standard or not.

Regards,

R

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From Tonya Watson - NOAA

On 3/19/14 05:51

correct...it is NOT NOAA practice to purposely deploy and pick up a powered up CTD. Any tech that has been letting scientists do it as a matter of practice, didn't know what they were doing (it happens we get a high turn over of inexperienced techs or augmenting techs who don't really know the whole story)...and generally speaking none of our ETs would want the responsibility of 'guarenteeing' there won't be a ground problem--so the ETs like the unit poweredd off too....

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From John Ahern/ LUMCON

On 3/19/14 06:43

so what is going to be your best practice moving forward? I've been thinking about the same thing. by default I don't turn on until its in the water. but I do try to mention to scientists that they don't get a pressure offset with that method. most have been ok with that. I was thinking a p offset should be good for at least a day if not a few. I'm going to get some insulated gloves and if turning on before going in the water is requested I'm going to require deployers wear them.

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**From:** Robert Hagg WHOI/Tech Pool

**Date:** March 19, 2014 7:53:47 AM MDT

I routinely deck test the CTD before deployment for my own benefit. Just to assure all the sensors are coming in, and everything looks good before we deploy. Otherwise a lot of time is wasted on recovering.

I have had situations where the last cast was fine, and prior to the next cast the deck test showed trouble, that turned out to be a bad ground cable. At that time we used pored terminations, with a lead from it to the splice.

I was told that this sci party at times only uses the internal conductors on the .322, one signal and one for ground, and do not use the armor for ground. In this case, I'm not sure how the NOAA ETs can easily test to see if the ground is solid.

I'm also curious to know if the NOAA ET checks the continuity of the ground prior to every cast? If not, it seems relying on the ET to check the termination once, isn't sound for assuring there is not a shock potential.

R

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**From:** Rich Findley RSMAS

**Date:** March 19, 2014 11:13:29 AM MDT

This should be a no brainer.

We power off during launch and recovery and station someone on deck to keep personnel clear of the system when it is powered up on deck for testing.

We are dealing with a piece of equipment on a wet deck carrying a voltage potential of almost 300 volts with the ability to deliver sufficient current to kill someone.

There have been several people in this thread that have said they have gotten shocked from a CTD so we know it is possible to have a ground problem.

Why would we even consider launching or retrieving with the power on?

Regards,  
Rich Findley

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**From:** Robert Hagg WHOI/Tech Pool  
**Date:** March 19, 2014 11:53:48 AM MDT

Because a researcher from your Institution says it's common for them to do so. They also tell me NOAA allows it as does other UNOLS vessels. I guessed that you would be one of those that would adopt that practice. I wanted to verify that indeed 'Other boats allow them to do it', before changing my standard procedure.

If you read my email closer you will see that I never have adopted that practice, and never deploy or recover a CTD powered up. However, if others were indeed routinely allowing the deployment and recovery of the CTD powered up, and it would make life easier for this science party, I would adopt whatever practices were considered standard.

If you are asking why they need to power up on deck, it allows them to determine the pressure bias and deploy without cycling SeaSave on and off. Saving time I assume. They felt it was inconvenient to power down, so I wanted to assure I wasn't being unduly cautious.

I appreciate the response from all the other responses.

Based on all the other currently at sea technicians experienced replies, except for special circumstances while wearing proper protective equipment, the standard procedure of deploying/recovering the CTD without power will remain my standard procedure.

Cheers,

Robb

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**From:** Rich Findley RSMAS  
**Date:** March 19, 2014 12:34:18 PM MDT

Robb,

Sorry, I had read the thread and was glad you brought up the issue. When I responded I wasn't questioning you or your procedure which is basically aligned with what we do. I was a little shocked (pun not intended) that no one flat out said don't do it and I responded forcefully because I felt so strongly.

I read why scientists thought there was a justification, but obviously science should never be put before safety.

One of the reasons RVTEC was formed was to be able to communicate with each other what "Other boats allow them to do", and you did just that.

I copied the Safety Committee which I am a member of, as this is not covered in the RVSS and it should be.

Thanks for your bringing this issue to everyone's attention.

Rich Findley

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**From:** Phil White - NOAA Federal

**Date:** March 19, 2014 1:30:06 PM MDT

Good thread.

I just want all to know that if an NOAA person tells you it's allowed. That may mean that at some point in time that person saw it. I wouldn't say NOAA allows it because there is no disseminated policy on this. At least it hasn't been disseminated to me.

I avoid (all caps, bold, italicized) launching and recovering live, but Scripps scientists insist on it. So on those cruises I do it but I don't like it. I have to say that I don't feel in particular danger either unless there is an incident where cable or cans are damaged.

It's threads like this that can foment policy creation or change.

Phil White

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**From:** Jim Newman WHMSI

**Date:** March 19, 2014 2:14:53 PM MDT

This is very similar to the various ROV deployments that I've been involved with for many years. There are practical reasons for why the vehicles need to be powered up for deployment, and the tether cables are often hand-tended, all with 2500 VAC or more on them. The power circuits are isolated from any frame or ship ground, and there is



isolation and in some cases hard connection of frames to ship's ground, so theoretically it's quite safe to touch this equipment, but we still don't permit personnel to touch energized vehicles or cables without high voltage gloves.

The CTD is different in that its voltage is lower, meaning your chances of surviving a catastrophe might be a little higher. On the other hand, it's DC, which is more dangerous than AC. Not sure, but I think I picked up that the power circuit is referenced to ship's ground, removing one level of safety that the ROVs usually have.

Regardless, there's no way that anyone should be touching these devices when power is on without proper gloves. Even if Scripps scientists insist on it. On the other hand, deploying them powered up, with personnel wearing gloves, should be reasonable.

Jim

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**From:** "David OGorman" OSU  
**Date:** March 19, 2014 2:26:28 PM MDT

Just to chime in with a "How we do it over here", we've deployed/recovered live a few times but don't currently have "A Policy" on it. We use the armor of the .322 for ground, so everything is pretty well grounded to the ship. I wouldn't mind a line in the safety book about how it should be done and how exceptions are made. Gloves might help a bit but we take a lot of water in our recovery area, so they wouldn't help all the time.

Dave

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**From:** Paul Duncan SOI/FALKOR  
**Date:** March 19, 2014 8:10:56 PM MDT

Hi,

Just another data point. Ships in the NERC fleet have always (well, at least since early 1990) powered up the CTD on deck and left it powered on during deployment. People helping with the deployment generally don't wear gloves (unless the weather demands it).

Last time I read the Seabird guidelines, I'm fairly sure they said that the CTD should be powered up prior to deployment as well.

I've had a really good think about this, and (at least with the mechanical terminations that I have used, both at NERC and SOI), I cannot see a way that the CTD supply voltage can get onto the outer armour of the cable (which on NERC ships is the negative/earth/ground) without blowing the seacable fuse on the deck unit. Perhaps someone can explain why I'm wrong 😊

Best Regards,

Paul.

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**From:** Trevor Young UH  
**Date:** March 20, 2014 4:33:48 AM MDT

Same here. On the Kilo Moana, and the KOK, we have always deployed with the CTD hot. We solder a pigtail to two armor strands of our .322 for our ground connection and seal it up good. Never heard of anyone here receiving a shock. Our termination does get cut off and re-done fairly regularly too (typically once per month).

Trevor Young

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**From:** Jim Newman WHMSI  
**Date:** March 20, 2014 6:13:28 AM MDT  
**To:** RVTEC@mail.unols.org

Most serious accidents are the product of two or more small mishaps. Like, for instance, a ground connection failing at the junction between an armored cable and a CTD rosette, along with a mis-wired ground on a DC power supply. Leading to a hot rosette frame and the potential for lethal shock hazard, without any certainty that a fuse would blow. The fact that it's never happened in any one person's experience doesn't change the likelihood — unlikely on any given deployment, much more likely over many deployments. If someone needs to be touching the rosette during powered-on deployment gloves are cheap insurance and should be considered best practice.

Someone was noting that gloves weren't practical in wet conditions —

I don't understand that. They're even more important (salt water-soaked skin is a great conductor), and should still be effective.

I do note that gloves are unappealing, particularly when it's hot out. People complain about them. If that's a compelling argument maybe it makes sense to hang the CTD out way from the ship on tag lines before powering it on.

Jim

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**From:** Trevor Young UH

**Date:** March 20, 2014 7:49:51 AM MDT

I've been doing this for relatively few years compared to most on this list so forgive my ignorance if I'm missing something obvious.

On 03/20/2014 02:13 AM, Jim Newman wrote:

Most serious accidents are the product of two or more small mishaps.

Like, for instance, a ground connection failing at the junction between an armored cable and a CTD rosette,

I could see how this may happen. Corrosion or physical stress might physically break leads or just make the connection bad.

along with a mis-wired ground on a DC power supply.

Wouldn't this show up during the pre-deployment deck test? If there is no ground return because of a broken conductor down at the CTD, wouldn't the deck unit complain? I would be very interested in hearing about occurrences when someone was shocked, and what the problem was determined to be.

Thanks

Trevor Young

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**From:** Rich Findley RSMAS

**Date:** March 20, 2014 8:29:19 AM MDT

All,

Trying to summarize things a bit.

The Carousel cage is what goes hot when the ground connection

between the armored cable and the CTD fails or develops electrical resistance.

Personnel grabbing the hot Carousel cage in the above condition complete the electrical circuit through their body to the deck. The full voltage of the deck unit ~300 volts and the full current that the deck unit can develop goes through their body. There is no reason for the fuse to blow, it is a completed circuit not a short circuit.

The fact that the system checks out fine when you power it up to launch doesn't mean a thing if the ground fails just as it is being deployed.

Yes the odds that failure happens at that exact instant is low, let's say one in a million. People play and win the lottery at much worse odds than that.

The idea that safety should be compromised because it is easier or saves time does not make sense. Think about being on a witness stand trying to explain that you thought it was a good idea to save some time and make things easier.

Regards,

Rich Findley

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**From:** Paul Duncan SOI/FALKOR  
**Date:** March 28, 2014 9:39:56 PM MDT

Hi All,

I contacted Seabird for their opinion on this subject. This is what they sent back, and they have given me permission to post it to the list.

Best Regards,

Paul.

----- Original Message -----

**Subject:** RE: Quick question  
**Date:** Tue, 25 Mar 2014 10:40:52 -0700  
**From:** Stephanie Jaeger  
<[sjaeger@seabird.com](mailto:sjaeger@seabird.com)>  
**To:** <[paul.d@soi-team.org](mailto:paul.d@soi-team.org)>  
**CC:** <[techsupport@seabird.com](mailto:techsupport@seabird.com)>

Hi Paul,

Thanks for your e-mail on this. When the entire system is cabled correctly with a proper ground, then the CTD can be powered on deck prior to deployment as explained in the FAQ that you mentioned: <http://www.seabird.com/FAQs/FAQsRecommendedPractices.htm#ProfilingSteps>

Powering up the CTD on deck prior to beginning the cast can serve to make sure the CTD is performing as expected and provides additional data that can be used as a potential diagnostic tool as needed.

If the system is cabled without a proper ground, then there is a possibility that the SBE9 package could carry a higher potential than the ship and may cause injury to crew handling the equipment as it goes over the side. See attached PDF for a diagram on this. This can also be found on pg. 20 from Module 4 of our training hand-outs here: <http://www.seabird.com/training/TrainingHandouts.htm>

So the potential issue lies in the return, and this is why the sea cable armor is recommended as the ground. Perhaps if the connection to the sea cable armor was broken exposing the SBE9 return wire one could imagine a way for someone who was grounded to touch the bare wire and get a shock.

Ultimately, the decision of when to power the CTD is at the discretion of the operating organization and the ship's crew, as they will be the most familiar with the integrity of the system installed on the ship and have their own best practices in place.

Let us know if any other questions come up.

Regards,  
Stephanie

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**From:** Robert Hagg WHOI/Tech Pool  
**Date:** March 29, 2014 6:09:28 AM MDT

Paul,

Thank you for sending that pdf.

The recommended method of terminating is the way I terminate. I learned it from Sharon Walker at NOAA, and Bob Baker. At one time we once used only the armor as ground with all three center conductors for Signal. On their cruise we were getting an unusual amount of noise 'spikes' for some reason.

Sharon suggested to try terminating their way, 'the recommended way' on the pdf, and all the noise went away. I've adopted that method whenever possible. It's a little harder to make a water tight splice with some mechanical terminations, but not overly difficult once you get use to it.

My thought is that we would know if we lost ground if we only used the

armor for ground. Therefore, deploying the cage with power on would have limited potential risk.

R

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**From:** Rich Findley RSMAS

**Date:** March 30, 2014 1:42:41 PM MDT

All,

The Safety Committee will be taking up this issue April 22<sup>nd</sup>. There has been a lot of discussion grounding and the possibility of electrical shock. I have not seen any discussion why there is a good scientific justification for deploying with power on. Faster or easier isn't a good reason in my opinion.

Also please open the discussion regarding any other equipment that there is a scientific or operational reason to deploy with the power on so this input may be provided to the Safety Committee.

Regards,

Rich Findley

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**From:** John Ahern LUMCON

**Date:** March 30, 2014 3:00:23 PM MDT

Can collecting data on deck provide a pressure measurement that can be used as a reference for correcting in water data?

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**From:** Rich Findley RSMAS

**Date:** March 30, 2014 4:40:17 PM MDT

John,

Yes the on deck information is useful for testing and getting zero depth and maybe some other info, but after you have done that why can't you shut it off and then deploy it? Looking for feedback.

Regards,

Rich Findley

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**From:** George Tupper WHOI  
**Date:** March 30, 2014 5:04:59 PM MDT

All,

My two cents...I'm not an expert, but - to me - there is inherent value in having the on-deck information and zero depth data in the same data record as the CTD cast, rather than having to initiate another data cycle, with the resulting hassle of accessing two separate data records to get the on-deck and zero-depth data to compare with the CTD cast. I know...it sounds lazy, but why over-complicate the data acquisition process and introduce possible errors, mistakes, operator error, etc.

George

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**From:** Jim Newman WHMSI  
**Date:** March 30, 2014 6:15:12 PM MDT

Rich —

I've worked with several scientific ROV systems that operate from UNOLS or similar research vessels with two-body systems, making deployment and recovery fairly complicated, and requiring man-handling of vehicles and cables. Systems I'm most familiar with are Hercules (Ocean Exploration Trust) and Deep Discoverer (NOAA Ocean Exploration). I know WHOI's Jason operates similarly. These vehicles are powered up while on deck, and kept powered up, so all the systems can be booted up and checked, attitude sensors stabilized, etc., before going in the water.

They are powered by high voltages — 2500-3000 VAC is typical. The power is isolated from frame ground, there is a ground fault interrupter on the topside power, and of course there is basic insulation. In spite of these multiple levels of protection, the rule in all cases is that anyone touching the vehicles while they are powered up must use high voltage "Linesman's" gloves rated for at least the nominal voltage of the vehicle power.

With most of these systems the tether cable that runs between the two vehicles has to be man-handled during deployment, so the same rule applies.



The vehicles are usually powered off just before being recovered onto the deck, so the gloves aren't required for the vehicle recovery.

This might represent a useful analog for your safety committee. While there are some differences I think the safety measures taken with the ROVs would be very appropriate for the CTD deployment, if there is a desire to have it powered on.

-- Jim

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**From:** Robert Hagg WHOI/Tech Pool  
**Date:** March 31, 2014 12:35:00 AM MDT

George,

Your explanation of the interest in deploying powered up is my understanding as well.

I felt if it was reasonable, given all the caution in this day and age, I would be happy to do so if it made life easier for the scientists. Although it's not my normal practice.

Once upon a time I processed acoustic data, and small things like this can be a big headache on the processing end.

Robb

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