

# TN400 ADCP cruise report

Thompson cruise TN400: San Diego to Honolulu, March 12-20, 2022.  
Purpose: troubleshoot the electrical noise in the os75.

## Abstract:

When electrical interference was present in the computer lab with the long cable, it went away when we went down to the laundry room and used the short cable, and was still present when we logged data back up in the computer lab with the long cable. The electrical noise is getting in through the long cable.

The electrical noise is intermittent. The presence of electrical noise in the velocities was only obvious at slower-than-underway speeds, possibly because the range decreased just enough to hide it. The stability of the temperature signal correlated strongly with the presence (or absence) of noise in the velocities.

Electrical noise is intermittent, but is getting in through the long RDI cable. Moving the deck unit and UPS to the laundry room to use the short cable removed the electrical noise.

## Tests:

- Only the first test (laundry room) did not use a UPS.  
Electrical interference depended on the power source

All the rest did use UPS power

- second test (computer lab): No electrical interference was found regardless of outlet
- third test
  - (a) "part08" (computer lab): Electrical interference was found under many circumstances
  - (b) "part11" (laundry): no electrical noise
  - (c) "part12" (computer lab): Electrical noise still present

## Test 1:

Speed and power source testing in the laundry room with the short RDI cable. No UPS was used for these tests. Electrical interference was present on some of the power sources. Only one caused interference problems with broadband mode.

## Test 2:

Two speed tests with different sources of power from UPS - the circuit (main UPS for the computer lab) and the old pre-shipyard rack-mounted UPS, powered from different power sources (plugs). No interference was detected.

## Test 3:

Test 3 was precipitated by a serendipitous slowdown of the ship to change which engine was being

used for the autopilot. Electrical interference was detected when the ship slowed down.

Since the electrical interference was apparently back, we immediately started testing. This time, we started with the usual long RDI cable and the deck unit in the rack. We worked out a plan with the engine room to test the two engines in autopilot and to try different power sources. The electrical noise was persistent.

### **(A) Engine and Power Tests**

We tested the use of autopilot on either port and starboard engine, and tested a variety of power sources (main lab UPS, rack-mounted UPS on clean power or dirty power) and the electrical noise was persistent. These tests used the long RDI cable, with the deck unit and the power all in the computer lab. The interference is identifiable because (1) it occurs below the range that the instrument should normally acquire good data, about 700m in this case, and (2) it is strongly biased. The bias is most obvious when the ship is sailing at 5-8kts.

### **(B) Laundry room, short RDI cable, UPS**

With the short RDI cable and the Rack-mounted UPS, we collected data in the laundry room. This data collection showed no signs of the electrical interference.

### **(C) Computer lab, UPS, long RDI cable**

Collecting data again with the long cable revealed the interference was still present.

### **Extra bonus: Temperature stability**

Plotting the temperature for the whole cruise showed that when we did not see interference, the temperature deviations were very small. But when interference was present, the temperature deviations were larger. This was particularly striking in the last short-cable test. The temperature deviations before and after the short-cable test were high (when the long cable was used and the electrical interference was obvious). But during the short-cable test, when no interference was visible, the temperatures were stable.

### **Tests: details**

Items in **blue** used the regular long RDI cable

Items in **brown** used the shorter pigtail, with the deck unit in the laundry room

==== overview =====

segment name	computer	programs version	date range		interference detected?	
TN400_part00	currents03tt	stage	2022/03/12	17:30 to 2022/03/14	02:34	NO
TN400_part01	(currents03tt	stable	2022/03/12	17:30 to 2022/03/14	02:34)	NO

**laundry room tests, no UPS**

TN400\_os75\_02 octopus (\*) stable 2022/03/12 22:57 to 2022/03/13 01:48 YES

**computer lab tests with UPS**

TN400\_part02 currents03tt (\*) stable 2022/03/14 02:38 to 2022/03/15 21:56 NO

- Upgrade currents04tt to Ubuntu 20.04
- update software to programs\_stage
- development, upgrade currents03tt to ubuntu 20.04

TN400_part03	currents04tt	stage	2022/03/15	22:05 to 2022/03/15	23:51	NO
TN400_part04	currents04tt	stage	2022/03/16	00:39 to 2022/03/16	02:45	NO
TN400_part05	currents04tt	stage	2022/03/16	04:16 to 2022/03/16	17:36	NO
TN400_part06	currents04tt	stage	2022/03/16	19:01 to 2022/03/16	19:47	NO
TN400_part07	currents04tt	stage	2022/03/16	19:54 to 2022/03/18	02:02	NO

- interference detected at slow speed (segment 08)

TN400_part08	currents04tt	stage	2022/03/18	02:13 to 2022/03/19	04:11	YES
TN400_part09	currents04tt	stage	2022/03/19	16:28 to 2022/03/19	16:29	

**Computer lab tests with UPS**

TN400\_part10 currents04tt (\*) stage 2022/03/19 16:30 to 2022/03/20 04:24 YES

**laundry room tests, with UPS**

TN400\_part11\_os75 octopus (\*) stable 2022/03/20 02:56 to 2022/03/20 03:45 NO

**Computer lab tests with UPS**

TN400\_part12 currents04tt (\*) stage 2022/03/20 04:29 to 2022/03/20 17:22 YES

(\*) = testing

==== Starting out: =====

2022-03-12 17:28:09,072 INFO StartCruise, new, cruiseid is TN400

=====  
 March 12  
 =====  
 currents03tt: logging data under TN400,  
 - wh300 pinging  
 - os75 in laundry room

=====  
 March 12 (late, into 3/13)  
 March 13 test (short pigtail, deck unit in laundry room)  
 =====  
 octopus: testing

startdd	enddd	start date,time	end time	circuit	where	description	cable len	ship speed (kts)
70.957 to 70.986		2022/03/12 22:57 to	23:39	L120	laundry	dirty power	6'	12,8,5,3
70.987 to 71.001		2022/03/12 23:40 to	00:01	UPS	complab	LAB UPS	200'	8,3
71.002 to 71.005		2022/03/13 00:02 to	00:07	SP204	complab	starboard	200'	3
71.007 to 71.015		2022/03/13 00:09 to	00:21	SP204	complab	port	200'	3
71.016 to 71.039		2022/03/13 00:22 to	00:56	??	head	unknown	200'	3,8
71.042 to 71.047		2022/03/13 01:00 to	01:08	??	hall	unknown	200'	12
71.048 to 71.075		2022/03/13 01:08 to	01:48	L120	laundry	dirty power	6'	12

see figs march13-pigtail\*.png

power sources:

- a 200' extension cord (or not)
- outlets:
  - "clean power" SP204 (no UPS)
  - "dirty power" hall, head (no UPS)
  - UPS Computer lab UPS circuit

-----  
 currents03tt: continue running with wh300 only  
 -----

reconnect long ADCP cable (replace pigtail)

=====  
 March 14  
 =====

testing os75 in the computer lab with the long cable.

First tests:

- compare 6' power cable on UPS-circuit and UPS-rack (plugged into SP204, as usual)
- add 30' extension cable: any difference?
- now compare UPS-rack plugged into SP204, hall, head (no difference)
- start speed test, settle on comparing 6'+30' power cable
  - UPS-rack plugged into SP204
  - lab UPS circuit
- move to on comparing 6' (no extension cable)
  - UPS-rack plugged into SP204
  - lab UPS circuit

details:

speed	power	ext-cable	duration	start time
12kts	UPS-wall	6'	10'	Sun, 13 Mar 2022 22:44:40 +0000
12kts	UPS-rack-SP204	6'	10'	Sun, 13 Mar 2022 22:56:17 +0000
12kts	UPS-rack-SP204	6'+30'	10'	Sun, 13 Mar 2022 23:07:49 +0000

-----  
 UPS-rack to ...

12kts	hall	6'+30'	10'	Sun, 13 Mar 2022 23:19:51 +0000
12kts	head	6'+30'	10'	Sun, 13 Mar 2022 23:32:04 +0000
12kts	SP204	6'+30'	10'	Sun, 13 Mar 2022 23:43:45 +0000

0 kts	SP204	6'+30'	10'	(continue)
0kts	UPS-wall	6'	10'	oops - wh300 failed to communicate - os75 failed to communicate - powered all down; reset USB-

serial

				- reboot
0kts	hall	6'+30'	10'	Mon, 14 Mar 2022 00:17:07 +0000
				Mon, 14 Mar 2022 00:28:33 +0000

0-3kts	UPS-wall	6'	10'	Mon, 14 Mar 2022 00:39:37 +0000
3kts	SP204-rack	6'	10'	Mon, 14 Mar 2022 00:51:33 +0000

3-5kts	SP204-rack	6'	10'	(continue)
5kts	UPS-wall	6'	10'	Mon, 14 Mar 2022 01:22:03 +0000

5kts-8kts	UPS-wall	6'	10'	(continue)
8kts	SP204-rack	6'	10'	Mon, 14 Mar 2022 01:45:19 +0000
8-12kts	SP204-rack	6'	10'	(continue)

12kts	circuit	6'	10'	Mon, 14 Mar 2022 02:12:36 +0000
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=====  
 Continuing  
 =====

currents03tt: logging data on wh300, os75bb, os75nb

Mon Mar 14 13:20:59 UTC 2022

revert this:

-----  
pycurrents/adcp/adcp\_specs.py

orig: 'refavg\_valcutoff' : 1,  
test: 'refavg\_valcutoff' : 0.5, # Thompson electrical noise #1,

=====  
Mark (engineer) is turning on a VM drive

=====  
Mon, 14 Mar 2022 17:57:31 +0000

No change seen.

=====  
more tests at the end, (\*)

Now changing computers and trying programs\_stage

TN400_part2	currents03tt	stable	2022/03/14	02:38	to	2022/03/15	21:56
TN400_part3	currents04tt	stage	2022/03/15	22:05	to	2022/03/15	23:51
TN400_part4	currents04tt	stage	2022/03/16	00:39	to	2022/03/16	02:45
TN400_part5	currents04tt	stage	2022/03/16	04:16	to	2022/03/16	17:36
TN400_part6	currents04tt	stage	2022/03/16	19:01	to	2022/03/16	19:47
TN400_part7	currents04tt	stage	2022/03/16	19:54	to	2022/03/18	02:02
TN400_part8	currents04tt	(*) stage	2022/03/18	02:13	to	2022/03/19	04:11

=====  
Power source tests in the computer lab, with the long cable

cd /Users/jules/data/uhdas\_data\_archive/evaluate/thompson/TN400\_legs/TN400\_part8/raw/os75

2022-03-18	02:11	to	2022-03-18	21:15	(76.091 to 76.885)	??	circuit UPS
2022-03-18	21:15	to	2022-03-18	23:48	(76.886 to 76.992)	??	circuit UPS
2022-03-18	23:49	to	2022-03-19	00:35	(76.992 to 77.025)	??	circuit UPS
Mar 18	23:59	tt	2022_076_85747	.raw			
Mar 19	00:35	tt	2022_077_00000	.raw			
2022-03-19	00:36	to	2022-03-19	00:47	(77.025 to 77.033)	slow down;	circuit UPS
2022-03-19	00:47	to	2022-03-19	00:54	(77.033 to 77.038)		circuit UPS
Mar 19	00:47	tt	2022_077_02170	.raw			
2022-03-19	00:56	to	2022-03-19	01:09	(77.040 to 77.048)		rack UPS (SP)
Mar 19	00:54	tt	2022_077_02874	.raw			
2022-03-19	01:10	to	2022-03-19	01:20	(77.049 to 77.056)		hall, no UPS
Mar 19	01:08	tt	2022_077_03415	.raw			
2022-03-19	01:21	to	2022-03-19	01:28	(77.057 to 77.061)		rack UPS: hall power
Mar 19	01:20	tt	2022_077_04209	.raw			
2022-03-19	01:29	to	2022-03-19	02:34	(77.062 to 77.107)	speed up;	circuit UPS
Mar 19	01:28	tt	2022_077_04910	.raw			
2022-03-19	01:45					slow down;	circuit UPS; VF already on (engineering)
2022-03-19	02:06						circuit UPS; VF off(engineering)
2022-03-19	02:17						circuit UPS; VF off(hydrolab)
2022-03-19	02:22						curcuit UPS; Knudsen deck unit off
2022-03-19	02:35	to	2022-03-19	04:04	(77.108 to 77.169)	speed up	
Mar 19	01:59	tt	2022_077_05365	.raw			
Mar 19	02:34	tt	2022_077_07200	.raw			
2022-03-19	04:04	to	2022-03-19	16:26	(77.170 to 77.685)		
Mar 19	04:00	tt	2022_077_09316	.raw			
Mar 19	04:03	tt	2022_077_14400	.raw			

```

=====
TN400_part09      currents04tt      stage 2022/03/19 16:28 to 2022/03/19 16:29 (one ping)
TN400_part10      currents04tt      (*) stage 2022/03/19 16:30 to 2022/03/20 04:24
TN400_part11_os75 octopus          (*) stable 2022/03/20 02:56 to 2022/03/20 03:45
TN400_part12      currents04tt      (*) stage 2022/03/20 04:29 to 2022/03/20 17:22
=====

```

"SP power" = SP204 circuit = clean power

```

gens      z-drive      comment
-----
1,3      whatever     12kts, TN400_part10, circuit UPS
1,3      whatever     12kts, rack UPS                               Sat, 19 Mar 2022 23:10:53
1,3      s           slow to 5kts                               Sat, 19 Mar 2022 23:22:49

```

confusion about settings

autopilot is on starboard, both are engaged

```

1,3      s   port engaged 5kts, rack UPS - main lab SP power  Sat, 19 Mar 2022 23:31:40
1,3      s   port down   5kts, rack UPS - main lab SP power  Sat, 19 Mar 2022 23:41:10

```

```

transition: switch (1,3) to (1,4), s auto, port engaged  Sat, 19 Mar 2022 23:46:55
now switching to (1,4)                               Sat, 19 Mar 2022 23:55:11

```

```

1,4      s   port engaged 5kts, rack UPS - main lab SP power Sat, 19 Mar 2022 23:55:11
1,4      s   port down   5kts, rack UPS - main lab SP power Sun, 20 Mar 2022 00:00:16

```

transition Sun, 20 Mar 2022 00:05:28 +0000 to Sun, 20 Mar 2022 00:05:28

```

3,4      s   port engaged 5kts, rack UPS - main lab SP power Sun, 20 Mar 2022 00:05:28
3,4      s   port down   5kts, rack UPS - main lab SP power Sun, 20 Mar 2022 00:14:10

```

```

---
switching to port autopilot,                               Sun, 20 Mar 2022 00:20:17
-----

```

```

Now test 200' extension cable, same settings as before    Sun, 20 Mar 2022 00:27:21
back to short AC extension cable                          Sun, 20 Mar 2022 00:34:47

```

```

-----
3,4      p   stbd engaged 5kts, rack UPS - main lab SP power  Sun, 20 Mar 2022 00:34:47
3,4      p   stbd down   5kts, rack UPS - main lab SP power  Sun, 20 Mar 2022 00:40:19

```

```

1,4      p   stbd engaged 5kts, rack UPS - main lab SP power  Sun, 20 Mar 2022 00:46:13
1,4      p   stbd down   5kts, rack UPS - main lab SP power  Sun, 20 Mar 2022 00:52:36

```

```

1,3      p   starbd engaged 5kts, rack UPS - main lab SP power Sun, 20 Mar 2022 00:57:48
1,3      p   stbd down   5kts, rack UPS - main lab SP power Sun, 20 Mar 2022 01:04:48

```

```

1,3      p   starbd engaged 5kts, rack UPS - main lab SP power Sun, 20 Mar 2022 01:12:46

```

```

---
switching to starboard autopilot,                          Sun, 20 Mar 2022 01:14:17
---

```

TN400\_part10 (os75)

```

tt2022_077_82974.raw: 77.960 to 77.965      2022/03/19 23:02:59 to 2022/03/19 23:10:16
tt2022_077_83526.raw: 77.967 to 77.974      2022/03/19 23:12:11 to 2022/03/19 23:22:33
tt2022_077_84206.raw: 77.975 to 77.987      2022/03/19 23:23:31 to 2022/03/19 23:41:04
tt2022_077_85325.raw: 77.988 to 77.991      2022/03/19 23:42:10 to 2022/03/19 23:46:42
tt2022_077_85653.raw: 77.991 to 77.995      2022/03/19 23:47:38 to 2022/03/19 23:52:18
tt2022_077_85993.raw: 77.995 to 78.000      2022/03/19 23:53:18 to 2022/03/19 23:59:57
tt2022_078_00000.raw: 78.000 to 78.000      2022/03/20 00:00:01 to 2022/03/20 00:00:13
tt2022_078_00065.raw: 78.001 to 78.004      2022/03/20 00:01:10 to 2022/03/20 00:05:25

```

```

tt2022_078_00376.raw: 78.004 to 78.005    2022/03/20 00:06:21 to 2022/03/20 00:07:31
tt2022_078_00500.raw: 78.006 to 78.010    2022/03/20 00:08:25 to 2022/03/20 00:13:54
tt2022_078_00887.raw: 78.010 to 78.014    2022/03/20 00:14:52 to 2022/03/20 00:19:36
tt2022_078_01226.raw: 78.014 to 78.018    2022/03/20 00:20:31 to 2022/03/20 00:25:44
tt2022_078_01625.raw: 78.019 to 78.024    2022/03/20 00:27:10 to 2022/03/20 00:34:02
tt2022_078_02109.raw: 78.024 to 78.028    2022/03/20 00:35:14 to 2022/03/20 00:40:06
tt2022_078_02455.raw: 78.028 to 78.032    2022/03/20 00:41:00 to 2022/03/20 00:46:13
tt2022_078_02821.raw: 78.033 to 78.036    2022/03/20 00:47:06 to 2022/03/20 00:52:23
tt2022_078_03194.raw: 78.037 to 78.040    2022/03/20 00:53:19 to 2022/03/20 00:57:46
tt2022_078_03513.raw: 78.041 to 78.045    2022/03/20 00:58:38 to 2022/03/20 01:04:44
tt2022_078_03934.raw: 78.046 to 78.050    2022/03/20 01:05:39 to 2022/03/20 01:12:43
tt2022_078_04415.raw: 78.051 to 78.055    2022/03/20 01:13:40 to 2022/03/20 01:18:32

```

```

=====
swap cable to laundry
=====

```

TN400\_part11 (os75) in the laundry

```

tt2022_078_10572.raw: 78.122 to 78.126    2022/03/20 02:56:16 to 2022/03/20 03:01:33
tt2022_078_10913.raw: 78.126 to 78.129    2022/03/20 03:01:57 to 2022/03/20 03:06:16
tt2022_078_11203.raw: 78.130 to 78.133    2022/03/20 03:06:47 to 2022/03/20 03:11:35
tt2022_078_13173.raw: 78.153 to 78.156    2022/03/20 03:39:38 to 2022/03/20 03:45:15

```

TN400\_part12 (os75) back in the computer lab

```

tt2022_078_16179.raw: 78.187 to 78.250    2022/03/20 04:29:42 to 2022/03/20 05:59:58
tt2022_078_21600.raw: 78.250 to 78.333    2022/03/20 06:00:00 to 2022/03/20 07:59:58
tt2022_078_28800.raw: 78.333 to 78.417    2022/03/20 08:00:00 to 2022/03/20 10:00:00
tt2022_078_36000.raw: 78.417 to 78.500    2022/03/20 10:00:02 to 2022/03/20 11:59:58
tt2022_078_43200.raw: 78.500 to 78.583    2022/03/20 12:00:00 to 2022/03/20 13:59:58
tt2022_078_50400.raw: 78.583 to 78.667    2022/03/20 14:00:00 to 2022/03/20 15:59:59
tt2022_078_57600.raw: 78.667 to 78.724    2022/03/20 16:00:01 to 2022/03/20 17:22:03

```

## Appendix

programs\_stable\_forships:

```

adcp_sphinxdoc 2ec631ea77ac 264 default tip
codas3          eachbd5569261 275 default tip
pycurrents     8687ef55268c 3231 default tip
uhdas          77c6f0367395 1464 default tip
onship         2decdb5c3153 1394 default tip
onship_private 1dc773ef2463 465 default tip
pytide         31840bbe046b 68 default tip
scripts        70062441e4e2 191 default tip

```

programs\_stage:

```

adcp_sphinxdoc 2ec631ea77ac 264 default tip
codas3          eachbd5569261 275 default tip
pycurrents     8687ef55268c+ 3231+ default tip
uhdas          77c6f0367395 1464 default tip
onship         2decdb5c3153 1394 default tip
onship_private 1dc773ef2463 465 default tip
pytide         31840bbe046b 68 default tip
scripts        70062441e4e2 191 default tip

```