IV.1.9- Technical Intervention Sheet

General		
Date (Start/End)	02/March/2012	02/March/2012
Time (Start/End)	09:00 (utc time)	12:30 (utc time)
Involved Personnel (name/position/organization)	marc.torner@socib.es - Glider Engineer - SOS Division - SOCIB	
	david.roque@socib.es - Glider Technician - SOS Division - SOCIB	
	miguel.martinez@uib.es - Electronics Lab - TMOOS - IMEDEA	
Specify if acting in substitution of somebody and why	Cayetana Casas - Skipper - IMEDEA's research vessel	
Main Location	Coast of 'Port de Sòller' (N39 57.447 E2 31.753)	

Typology		
☐ routinary	☐ spontaneous	☐ scheduled since
☐ pre-mission	☑ on-mission	☐ post-mission
Motivation	☐ mission abort	☐ no specific reason
	☑ improper behavior	☐ on behalf of
	☐ something is not right	☐ other:

Vehicle			
Nature	Electric Glider	**Model**	SLOCUM 1000m
Name	sdeep00	**Reference #**	243
Mission	triang01.mi as part of Depth Test Campaign February 2012		
Notes	This vehicle performed overtime.mi, ovrdepth.mi, W50, Vs (100, 200, 450, 600, 800 and 950), and one night diving at 450m, prior to the launching of triang01.mi. This one implied the infinite repetition of a closed circuit formed by three waypoints and ment to be a robustness and operational benchmark test. This mission started on Wednesday 29th at 16utc approx.		

Incidence Observations / Evaluation

Having performed triang01.mi for 16 hours (diving at 950m non-stop), at 8utc on Thursday 1st of March, sdeep00 reported a mission abort specifying MS_ABORT_DEVICE_ERROR. Remote review of critical parameters was done and the mission re-launched thinking that it was something sporadic. Only 5 hours and one a half dives at 950m later, the same abort arose.
Both situations were immediately consulted with the manufacturer, TWR. Having received quick responses from TWR, the second answer encouraged us to make the glider transmit a .MLG file (which is a quite big file to be sent over Iridium) so we did. This action was extremely useful since it pointed the real cause of the abort: buoyancy pump being faulted and power cycled to perform an emergency ascent. (note: Deadman is a virtual device, 'all software', watching over critical devices. Deadman was the device which reported 1 error after each abort).
The next call after that finding the glider was commanded to dive at 750m to be recovered some hours later. The glider team of SOCIB decided to do so considering the triggering event and the device which was originating it.
This issue with the de_pump was introduced to the team by John Dingess (TWR) who replaced the motor controllers of units 243 and 244 with the justification of an unnoticed change in the controller's firmware which could cause this pump's fault.

Undertaken Actions

Both aborts were explained to TWR and suggestions/opinions asked in order to take a rational decision wether to recover the vehicle or leave it diving at shallower depths (i.e. 750m).
MLG file corresponding to the second aborted segment sent over Iridium and the depth of the triang01.mi mission reduced from 950m to 750m.
Finally, the vehicle was recovered.
At this moment, unit243 is waiting on the decision of actions to be undertaken. This discussion is already active and should produce a plan of repair/inspection within the following days.

Used Resources

Recovery carried on by a three people team field and

Invested Hours	3h30m		
Estimated Cost	**HHRR:** 2 operators	**Material:**	**Others:** logistics

Conclusions / Future Actions

Glider software and mission execution seems to work fine.
Hull sealing has also been confirmed.
Communications with both IMEDEA's dockserver and remote dockserver (TWR) have worked pretty good. (only one call was missed by both receivers).
Primary Question: "Is this sporadic or the motor controller replacement haven't been effective in solving the pump being power cycled"

Outsource Recommendations / Comments

Intervention sheet ratified by: Marc Torner

date: 05/march/2012

place: Gliderlab@IMEDEA

Complementary Images

i) record of the instant in which the pump error occurred the first time

```
58574   DRIVER_ODDITY:watchdog:0:!Buoyancy Pump is FAULTED!
58574   DRIVER_ERROR:deadman_ctrl():6:199:!Buoyancy Pump is FAULTED!
58574   call_and_queue_if_reqd(): device deadman TAKEN OUT OF SERVICE
58579 28 ERROR behavior ?_-1: abort_the_mission(0): (16)MS_ABORT_DEVICE_ERROR
58579   behavior ?_-1: abort_the_mission(): Changing U_CYCLE_TIME from 4.000000 to 15.000000
58579   save_and_change_sensors()....
      Changed u_depth_rate_filter_factor from 4 to -1
Exiting all devices ...
58579   DRIVER_ODDITY:watchdog:0:!Buoyancy Pump is FAULTED!
init_all_devices(1):
CRITICAL Device was OUT OF SERVICE, RETRYING: deadman
      argos      watchdog      deadman      console
       gps   attitude_rev  ocean_pressure      vacuum
     battery      air_pump    pitch_motor   science_super
     digifin     altimeter      iridium     leakdetect
     coulomb      veh_temp      de_pump
start_alldevices()
```

ii) record of the instant in which the pump error occurred the second time

```
10475 44 behavior sample_10: SUBSTATE 1 ->3 : Climbing
10475   DRIVER_ODDITY:watchdog:0:!Buoyancy Pump is FAULTED!
10475   DRIVER_ERROR:deadman_ctrl():6:199:!Buoyancy Pump is FAULTED!
10475   call_and_queue_if_reqd(): device deadman TAKEN OUT OF SERVICE
10480 44 ERROR behavior ?_-1: abort_the_mission(0): (16)MS_ABORT_DEVICE_ERROR
10480   behavior ?_-1: abort_the_mission(): Changing U_CYCLE_TIME from 4.000000 to 15.000000
10480   save_and_change_sensors()....
      Changed u_depth_rate_filter_factor from 4 to -1
Exiting all devices ...
10480   DRIVER_ODDITY:watchdog:0:!Buoyancy Pump is FAULTED!
init_all_devices(1):
CRITICAL Device was OUT OF SERVICE, RETRYING: deadman
      argos      watchdog      deadman      console
       gps   attitude_rev  ocean_pressure      vacuum
     battery      air_pump    pitch_motor   science_super
     digifin     altimeter      iridium     leakdetect
     coulomb      veh_temp      de_pump
start_alldevices()
```