Spreadsheet

M B A R I

Interfaces on the initial (engineering) MOOS deployment

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Purpose
1. Reliability of data/power cable & mooring mechanical hardware
2. Reliability/feasability of ROV operations in connection to mooring

Items to monitor
1. Loads
2. Visual wear
3. Sea keeping ability
4. Riser strain releif
   a. length
   b. connection position
   c. connection wear
   d. connection movement
5. Meteorology using M2 or local NOAA

Responsible Engineer		Signal Description	Supply voltage & current	Sensor interface	Input Sensor range / units	Desired Precision	Desired Accuracy (% error)	Desired ADC resolution	Software Sample frequency	Log Interval			Actual Software Values ADC	ADC Range	ADC Precision	Software Conversion	Log/Display range	Log / Send/Event	Software Channel	Notes
Software	Hardware	**Surface side**								min	max	avg								
Mike Risi	Ed Mellenger	*Power System – 0.1% accuracy & resolution (desired)*																		
Mike Risi	Ed Mellenger	*Seawater Battery (prototype)*																		
Mike Risi	Ed Mellenger	Battery Voltage 1 - chemistry type A	n/a	Analog	0 to 2 VDC	1mV	1%	11-bit	1/min	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	Linear Scale	0 to 2 VDC	Log/Send	Serial via DPA	0 to 1VDC, up to 4 batteries, simple voltage across a resistor
Mike Risi	Ed Mellenger	Battery Voltage 2 - chemistry type B	n/a	Analog	0 to 2 VDC	1mV	1%	11-bit	1/min	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	Linear Scale	0 to 2 VDC	Log/Send	Serial via DPA	0 to 1VDC, up to 4 batteries, simple voltage across a resistor
Mike Risi	Ed Mellenger	Battery Voltage 3 - chemistry type C	n/a	Analog	0 to 2 VDC	1mV	1%	11-bit	1/min	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	Linear Scale	0 to 2 VDC	Log/Send	Serial via DPA	0 to 1VDC, up to 4 batteries, simple voltage across a resistor
Mike Risi	Ed Mellenger	Battery Voltage 4 - chemistry type D	n/a	Analog	0 to 2 VDC	1mV	1%	11-bit	1/min	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	Linear Scale	0 to 2 VDC	Log/Send	Serial via DPA	0 to 1VDC, up to 4 batteries, simple voltage across a resistor
Mike Risi	Ed Mellenger	*Battery (possibly two battery banks up to 8 batteries)*																		
Mike Risi	Ed Mellenger	Battery Current Sensor Enable	n/a	Digital	n/a	n/a	n/a	n/a	1/day?	n/a	n/a	n/a					On/Off	n/a	Serial via DPA	Turns on the current sensors prior to take current measurements
Mike Risi	Ed Mellenger	Battery Current 1	n/a	Analog	TBD	7.5mA	0.10%	12-bit	1/sec	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	Linear Scale	-10 to +20 A	Log/Send	Serial via DPA	Current to voltage measurement
Mike Risi	Ed Mellenger	Battery Current 2	n/a	Analog	TBD	7.5mA	0.10%	12-bit	1/sec	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	Linear Scale	-10 to +20 A	Log/Send	Serial via DPA	Current to voltage measurement - leave if we can
Mike Risi	Ed Mellenger	Battery Current 3	n/a	Analog	TBD	7.5mA	0.10%	12-bit	1/sec	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	Linear Scale	-10 to +20 A	Log/Send	Serial via DPA	Current to voltage measurement - leave if we can
Mike Risi	Ed Mellenger	Battery Current 4	n/a	Analog	TBD	7.5mA	0.10%	12-bit	1/sec	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	Linear Scale	-10 to +20 A	Log/Send	Serial via DPA	Current to voltage measurement - leave if we can
Mike Risi	Ed Mellenger	Battery Current 5	n/a	Analog	TBD	7.5mA	0.10%	12-bit	1/sec	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	Linear Scale	-10 to +20 A	Log/Send	Serial via DPA	Current to voltage measurement - leave if we can
Mike Risi	Ed Mellenger	Battery Current 6	n/a	Analog	TBD	7.5mA	0.10%	12-bit	1/sec	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	Linear Scale	-10 to +20 A	Log/Send	Serial via DPA	Current to voltage measurement - leave if we can
Mike Risi	Ed Mellenger	Battery Current 7	n/a	Analog	TBD	7.5mA	0.10%	12-bit	1/sec	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	Linear Scale	-10 to +20 A	Log/Send	Serial via DPA	Current to voltage measurement - leave if we can
Mike Risi	Ed Mellenger	Battery Current 8	n/a	Analog	TBD	7.5mA	0.10%	12-bit	1/sec	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	Linear Scale	-10 to +20 A	Log/Send	Serial via DPA	Current to voltage measurement - leave if we can
Mike Risi	Ed Mellenger	Battery Voltage	n/a	Analog	0 to between 8 & 16 VDC	10mV	0.10%	11-bit	1/sec	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	Linear Scale	0 to between 8 & 16 VDC	Log/Send	Serial via DPA	
Mike Risi	Ed Mellenger	Water detection 1	n/a	Analog	0 to +5V	100mV	5%	6-bit	1/sec	instantaneous	instantaneous	instantaneous	12-bit	10V	2.441mV	Linear Scale	0 to +5V	Log/Send/Event	Serial via DPA	Is there moisture in the battery case
Mike Risi	Ed Mellenger	Water detection 2	n/a	Analog	0 to +5V	100mV	5%	6-bit	1/sec	instantaneous	instantaneous	instantaneous	12-bit	10V	2.441mV	Linear Scale	0 to +5V	Log/Send/Event	Serial via DPA	Is there moisture in the battery case
Mike Risi	Ed Mellenger	Water detection 3	n/a	Analog	0 to +5V	100mV	5%	6-bit	1/sec	instantaneous	instantaneous	instantaneous	12-bit	10V	2.441mV	Linear Scale	0 to +5V	Log/Send/Event	Serial via DPA	Is there moisture in the battery case
Mike Risi	Ed Mellenger	Water detection 4	n/a	Analog	0 to +5V	100mV	5%	6-bit	1/sec	instantaneous	instantaneous	instantaneous	12-bit	10V	2.441mV	Linear Scale	0 to +5V	Log/Send/Event	Serial via DPA	Is there moisture in the battery case
Mike Risi	Ed Mellenger	Water detection 5	n/a	Analog	0 to +5V	100mV	5%	6-bit	1/sec	instantaneous	instantaneous	instantaneous	12-bit	10V	2.441mV	Linear Scale	0 to +5V	Log/Send/Event	Serial via DPA	Is there moisture in the battery case
Mike Risi	Ed Mellenger	Water detection 6	n/a	Analog	0 to +5V	100mV	5%	6-bit	1/sec	instantaneous	instantaneous	instantaneous	12-bit	10V	2.441mV	Linear Scale	0 to +5V	Log/Send/Event	Serial via DPA	Is there moisture in the battery case
Mike Risi	Ed Mellenger	Water detection 7	n/a	Analog	0 to +5V	100mV	5%	6-bit	1/sec	instantaneous	instantaneous	instantaneous	12-bit	10V	2.441mV	Linear Scale	0 to +5V	Log/Send/Event	Serial via DPA	Is there moisture in the battery case
Mike Risi	Ed Mellenger	Water detection 8	n/a	Analog	0 to +5V	100mV	5%	6-bit	1/sec	instantaneous	instantaneous	instantaneous	12-bit	10V	2.441mV	Linear Scale	0 to +5V	Log/Send/Event	Serial via DPA	Is there moisture in the battery case
Mike Risi	Ed Mellenger	*Solar panels (each of four)*																		
Mike Risi	Ed Mellenger	Array Current North	n/a	Analog	TBD	2.5mA	0.10%	12-bit	1/sec	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	Linear Scale	0 to 10 A	Log/Send	Serial via DPA	Current to voltage measurement
Mike Risi	Ed Mellenger	Array Current East	n/a	Analog	TBD	2.5mA	0.10%	12-bit	1/sec	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	Linear Scale	0 to 10 A	Log/Send	Serial via DPA	Current to voltage measurement
Mike Risi	Ed Mellenger	Array Current South	n/a	Analog	TBD	2.5mA	0.10%	12-bit	1/sec	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	Linear Scale	0 to 10 A	Log/Send	Serial via DPA	Current to voltage measurement
Mike Risi	Ed Mellenger	Array Current West	n/a	Analog	TBD	2.5mA	0.10%	12-bit	1/sec	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	Linear Scale	0 to 10 A	Log/Send	Serial via DPA	Current to voltage measurement
Mike Risi	Ed Mellenger	Array Voltage North	n/a	Analog	0 to 50 VDC	25mV	0.10%	11-bit	1/sec	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	Linear Scale	0 to 50 VDC	Log/Send	Serial via DPA	
Mike Risi	Ed Mellenger	Array Voltage East	n/a	Analog	0 to 50 VDC	25mV	0.10%	11-bit	1/sec	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	Linear Scale	0 to 50 VDC	Log/Send	Serial via DPA	
Mike Risi	Ed Mellenger	Array Voltage South	n/a	Analog	0 to 50 VDC	25mV	0.10%	11-bit	1/sec	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	Linear Scale	0 to 50 VDC	Log/Send	Serial via DPA	
Mike Risi	Ed Mellenger	Array Voltage West	n/a	Analog	0 to 50 VDC	25mV	0.10%	11-bit	1/sec	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	Linear Scale	0 to 50 VDC	Log/Send	Serial via DPA	
Mike Risi	Ed Mellenger	Load resistor (lost potential energy)	n/a	Analog	0 to 16 VDC	10mV	0.10%	11-bit	1/sec	1hr	1hr	1hr	12-bit	10V	2.441mV	Linear Scale	0 to 16 VDC	Log/Send	Serial via DPA	simple voltage across a resistor after a 12V zener
Mike Risi	Ed Mellenger	Light sensor (PAR or pyrometer)	n/a	Analog	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	12-bit	10V	2.441mV	TBD	TBD	Log/Send	Serial via DPA	Top mounted Hemispheric light meter (Mike Kelley) (Biospherical or LI-COR) Need wavelength parameters.
Mike Risi	Ed Mellenger	*Wind Turbine*																		
Mike Risi	Ed Mellenger	Load resistor (lost potential energy)	n/a	Analog	0 to 16 VDC	10mV	0.10%	11-bit	1/sec	1hr	1hr	1hr	12-bit	10V	2.441mV	Linear Scale	0 to 16 VDC	Log/Send	Serial via DPA	simple voltage across a resistor after a 12V zener
Mike Risi	Ed Mellenger	*Power Feed (NMC)*																		
Mike Risi	Ed Mellenger	Current	n/a	Analog	TBD	2mA	TBD	12-bit	10/sec	1hr	1hr	1hr	12-bit	10V	2.441mV	Linear Scale	0 to 5 A	Log/Send	Serial via DPA	Current to voltage measurement
Mike Risi	Ed Mellenger	*Cable Feed*																		
Mike Risi	Ed Mellenger	Cable Current	n/a	Analog	TBD	0.25mA	TBD	12-bit	10/sec	1hr	1hr	1hr	12-bit	10V	2.441mV	Linear Scale	0 to 1 A	Log/Send	Serial via DPA	Current to voltage measurement
Mike Risi	Ed Mellenger	Cable Voltage	n/a	Analog	0 to 500 VDC	1V	0.10%	9-bit	10/sec	1hr	1hr	1hr	12-bit	10V	2.441mV	Linear Scale	0 to 500 VDC	Log/Send	Serial via DPA	
Mike Risi	Ed Mellenger	Ground fault	n/a	Analog	-1mA to +1mA	5mV	0.10%	10-bit	interupt	instantaneous	instantaneous	instantaneous	12-bit	10V	2.441mV	Linear Scale	0 to +5V	Log/Send/Event	Serial via DPA	
Mike Risi	Ed Mellenger	*Environmental (power housing)*																		
Mike Risi	Ed Mellenger	Pwr Hsg Temp	n/a	Analog	TBD	2c	1%	6-bit	1/min	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	Calib. Lkup Tbl	-25 to +75c	Log/Send	Serial via DPA	
Mike Risi	Ed Mellenger	Pwr Hsg Humidity	n/a	Analog	TBD	5%	1%	5-bit	1/min	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	???	0 to 100%	Log/Send	Serial via DPA	
Mike Risi	Ed Mellenger	*Controller with data storage*																		
Mike Risi	Ed Mellenger	Pwr Sys Control Functions																		
Mike Risi ?	Mark Chaffey	Heave Wave sensor	12-14 VDC @ 45mA	Serial															Serial via DPA	Triaxys
Mike Risi ?	Mark Chaffey	⁞ Spectral Analysis Statistics																		
Mike Risi ?	Mark Chaffey	*Significant Wave Height (Hmo)*			not specified	not specified	2%	n/a	35 minutes	n/a	n/a	35 minutes					0.000 to 9.999m	Log/Send	n/a	See Triaxys manual
Mike Risi ?	Mark Chaffey	*Peak Period (Tp, Tp5)*			not specified	not specified	2%	n/a	35 minutes	n/a	n/a	35 minutes					0.000 to 9.999s	Log/Send	n/a	See Triaxys manual
Mike Risi ?	Mark Chaffey	*Mean Spectral Period (Tz)*			not specified	not specified	2%	n/a	35 minutes	n/a	n/a	35 minutes					see manual	Log/Send	n/a	See Triaxys manual
Mike Risi ?	Mark Chaffey	⁞ Zero Crossing Statistics																		
Mike Risi ?	Mark Chaffey	*Significant Wave Height (Hs)*			not specified	not specified	2%	n/a	35 minutes	n/a	n/a	35 minutes					0.000 to 9.999m	Log/Send	n/a	See Triaxys manual
Mike Risi ?	Mark Chaffey	*Maximum Wave Height (Hmax)*			not specified	not specified	2%	n/a	35 minutes	n/a	n/a	35 minutes					0.000 to 9.999m	Log/Send	n/a	See Triaxys manual
Mike Risi ?	Mark Chaffey	*Height of Highest 10% of Waves (H10)*			not specified	not specified	2%	n/a	35 minutes	n/a	n/a	35 minutes					see manual	Log/Send	n/a	See Triaxys manual
Mike Risi ?	Mark Chaffey	*Average Wave Height (Hav.)*			not specified	not specified	2%	n/a	35 minutes	n/a	n/a	35 minutes					0.000 to 9.999s	Log/Send	n/a	See Triaxys manual
Mike Risi ?	Mark Chaffey	*Average Wave Period (Tav.)*			not specified	not specified	2%	n/a	35 minutes	n/a	n/a	35 minutes					0.000 to 9.999s	Log/Send	n/a	See Triaxys manual
Mike Risi ?	Mark Chaffey	*Average Period of H10 (T10)*			not specified	not specified	2%	n/a	35 minutes	n/a	n/a	35 minutes					see manual	Log/Send	n/a	See Triaxys manual
Mike Risi ?	Mark Chaffey	*Significant Wave Period (Ts)*			not specified	not specified	2%	n/a	35 minutes	n/a	n/a	35 minutes					0.000 to 9.999s	Log/Send	n/a	See Triaxys manual
Mike Risi ?	Mark Chaffey	*Zero Crossings*			not specified	not specified	2%	n/a	35 minutes	n/a	n/a	35 minutes					see manual	Log/Send	n/a	See Triaxys manual
Mike Risi ?	Mark Chaffey	⁞ Power (non-directional) Spectra																		
Mike Risi ?	Mark Chaffey	*Energy for Each Frequency Band*			not specified	not specified	2%	n/a	35 minutes	n/a	n/a	35 minutes					see manual	Log/Send	n/a	See Triaxys manual
Mike Risi	Mark Chaffey	buoy tension load cell (strain guage)	n/a	Analog	not specified	not specified	TBD	TBD	4/sec	TBD	TBD	TBD	12-bit	10V	2.441mV	TBD	TBD	Log/Send	Serial via DPA	Wheatstone bridge - voltage measurement (measuring axial strain)
	Mark Chaffey	Environmental																		METSYS or ASIMET or other?
Mike Risi	Ed Mellenger	Ambient Air Temp	n/a	Analog	1-40kohm	2c	1%	6-bit	1/min	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	Calib. Lkup Tbl	-25 to +75c	Log/Send	Serial via DPA	
Tom O'Reilly	Mark Chaffey	compass	8-18 VDC @ 40mA.	Serial	current heading 0-360, turns +/-100	0.5 deg	1 deg	n/a	1/sec	n/a	n/a	1 min					current heading 0-360, turns +/-100	Log/Send	Sidekick serial	KVH compass
Tom O'Reilly	Lance McBride	*Turns indicator*	n/a	Software	see compass	0.1 turn	0.2 turn	n/a	1/sec	10min	10min	10min					0-255 turns	Log/Send	n/a	**integrate the sampled compass heading. +1 for every pass of +360Ö -1 for every pass of -360Ö**
Mike Risi	Mark Chaffey	Fiber Optic Cable Tester ch. 1	TBD	Analog	TBD	TBD	TBD	TBD	4/sec	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	TBD	TBD	Log/Send	Serial via DPA	Custom Fiber optic test board
Mike Risi	Mark Chaffey	Fiber Optic Cable Tester ch. 2	TBD	Analog	TBD	TBD	TBD	TBD	4/sec	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	TBD	TBD	Log/Send	Serial via DPA	
Mike Risi	Mark Chaffey	Fiber Optic Cable Tester ch. 3	TBD	Analog	TBD	TBD	TBD	TBD	4/sec	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	TBD	TBD	Log/Send	Serial via DPA	
Mike Risi	Mark Chaffey	Fiber Optic Cable Tester ch. 4	TBD	Analog	TBD	TBD	TBD	TBD	4/sec	1 hr	1 hr	1 hr	12-bit	10V	2.441mV	TBD	TBD	Log/Send	Serial via DPA	
	Lance McBride	MBARI wireless comms (VHF, Freewave, satellite, etc.)																		
Tim Meese	Lance McBride	- Satellite (Iridium, Orbcomm, Globalstar)	5.6-16VDC @ 1Amax	Serial	N/A	N/A	N/A	n/a	N/A	N/A	N/A	N/A					N/A	n/a	SideARM serial	Over the horizon comms
Tim Meese	Lance McBride	- Link strength	n/a	Software	0 to +50dbm	0.1dbm	1%	n/a	1/min	15min	15min	15min					0 to +50dbm	Log/Send	n/a	Accurate report of link margin
n/a	Lance McBride	- Local (BT console)	9-30VDC @ 500mW	Serial	N/A	N/A	N/A	n/a	N/A	N/A	N/A	N/A					N/A	n/a	SideARM serial	Ship to buoy comms
n/a	Lance McBride	- ARGOS transponder (ELT)	Stand Alone	Stand Alone	N/A	N/A	N/A	n/a	N/A	N/A	N/A	N/A					N/A	n/a	n/a	SEIMAC SMART CAT III, Sat Comms.
Kent Headley	Lance McBride	GPS	6-40VDC @ 870mWtyp	Serial	-180..+180N/S, -180..+180E/W	0.0001deg	100m	n/a	1/min	10min	10min	10min					-180..+180N/S, -180..+180E/W	Log/Send	Serial via DPA	Are we implementing the 1ms (?) timing accuracy
n/a	Lance McBride	Pager (reset)	1.5V @ ??mA	2-wire differential	n/a	n/a	n/a	n/a	interupt	instantaneous	instantaneous	instantaneous					N/A	Log/Send	reset line	Satellite (?) reset for processor wakeup
Kent Headley	Lance McBride	SideKick																		
Kent Headley	Lance McBride	ground fault	n/a	Digital	0 or +5V	n/a	n/a	n/a	interupt	instantaneous	instantaneous	instantaneous					0 or +5V	Log/Send	Sidekick	
Kent Headley	Lance McBride	moisture detection	n/a	Digital	0 or +5V	n/a	n/a	n/a	interupt	instantaneous	instantaneous	instantaneous					0 or +5V	Log/Send	Sidekick	
		Riser cable																		
		no monitoring																		
		Benthic side																		
Mike Risi	Mark Chaffey	anchor tension load cell (strain gauge)	n/a	Analog	TBD	TBD	TBD	TBD	4/sec	TBD	TBD	TBD	12-bit	10V	2.441mV	TBD	TBD	Log/Send	Serial via DPA	Wheatstone bridge - voltage measurement (measuring axial strain)
n/a	Lance McBride	locator beacon, "homer" (contact Mike Conway 1wk prior to deployment)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a					n/a	Log/Send	n/a	Sonic location beacon (self-powered)

Total Analog 46*
Total Digital 16*
Total Serial 7*
Maximum Resolution 12-bit

*Numbers may not be exact due to "hidden" cells for future expansion