

Spreadsheet		Interfaces on the initial (engineering) MOOS deployment		Copyright © 2002 MBARI
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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

Resp. Engr.	Signal Description	Supply voltage & current	Sensor interface	Display range	Sample frequency	Averaging Interval (min, max, avg)	Sensor range / units	Resolution (Precision)	ADC	Accuracy (% error)	Upload to shore?	Notes
	Surface side											
Ed Mellenger	Power System -- 0.1% accuracy & resolution (desired)											
Ed Mellenger	Seawater Battery (prototype)											
Ed Mellenger	Battery Voltage 1 - chemistry type A	n/a	Analog	0 to 2 VDC	1/min	1 hr	0 to 2 VDC	1mV	11-bit	1%		0 to 1VDC, up to 4 batteries, simple voltage across a resistor
Ed Mellenger	Battery Voltage 2 - chemistry type B	n/a	Analog	0 to 2 VDC	1/min	1 hr	0 to 2 VDC	1mV	11-bit	1%		0 to 1VDC, up to 4 batteries, simple voltage across a resistor
Ed Mellenger	Battery Voltage 3 - chemistry type C	n/a	Analog	0 to 2 VDC	1/min	1 hr	0 to 2 VDC	1mV	11-bit	1%		0 to 1VDC, up to 4 batteries, simple voltage across a resistor
Ed Mellenger	Battery Voltage 4 - chemistry type D	n/a	Analog	0 to 2 VDC	1/min	1 hr	0 to 2 VDC	1mV	11-bit	1%		0 to 1VDC, up to 4 batteries, simple voltage across a resistor
Ed Mellenger	Battery (possibly two battery banks up to 8 batteries)											
Ed Mellenger	Battery Current 1	n/a	Analog	-10 to +20 A	1/sec	1 hr	TBD	7.5mA	12-bit	0.10%		Current to voltage measurement
Ed Mellenger	Battery Current 2	n/a	Analog	-10 to +20 A	1/sec	1 hr	TBD	7.5mA	12-bit	0.10%		Current to voltage measurement - leave if we can
Ed Mellenger	Battery Current 3	n/a	Analog	-10 to +20 A	1/sec	1 hr	TBD	7.5mA	12-bit	0.10%		Current to voltage measurement - leave if we can
Ed Mellenger	Battery Current 4	n/a	Analog	-10 to +20 A	1/sec	1 hr	TBD	7.5mA	12-bit	0.10%		Current to voltage measurement - leave if we can
Ed Mellenger	Battery Current 5	n/a	Analog	-10 to +20 A	1/sec	1 hr	TBD	7.5mA	12-bit	0.10%		Current to voltage measurement - leave if we can
Ed Mellenger	Battery Current 6	n/a	Analog	-10 to +20 A	1/sec	1 hr	TBD	7.5mA	12-bit	0.10%		Current to voltage measurement - leave if we can
Ed Mellenger	Battery Current 7	n/a	Analog	-10 to +20 A	1/sec	1 hr	TBD	7.5mA	12-bit	0.10%		Current to voltage measurement - leave if we can
Ed Mellenger	Battery Current 8	n/a	Analog	-10 to +20 A	1/sec	1 hr	TBD	7.5mA	12-bit	0.10%		Current to voltage measurement - leave if we can
Ed Mellenger	Battery Voltage	n/a	Analog	0 to between 8 & 16 VDC	1/sec	1 hr	0 to between 8 & 16 VDC	10mV	11-bit	0.10%		
Ed Mellenger	Water detection 1	n/a	Digital	0 to +5V	1/sec	instantaneous	0 to +5V	100mV	6-bit	5%		Is there moisture in the battery case
Ed Mellenger	Water detection 2	n/a	Digital	0 to +5V	1/sec	instantaneous	0 to +5V	100mV	6-bit	5%		Is there moisture in the battery case
Ed Mellenger	Water detection 3	n/a	Digital	0 to +5V	1/sec	instantaneous	0 to +5V	100mV	6-bit	5%		Is there moisture in the battery case
Ed Mellenger	Water detection 4	n/a	Digital	0 to +5V	1/sec	instantaneous	0 to +5V	100mV	6-bit	5%		Is there moisture in the battery case
Ed Mellenger	Water detection 5	n/a	Digital	0 to +5V	1/sec	instantaneous	0 to +5V	100mV	6-bit	5%		Is there moisture in the battery case
Ed Mellenger	Water detection 6	n/a	Digital	0 to +5V	1/sec	instantaneous	0 to +5V	100mV	6-bit	5%		Is there moisture in the battery case
Ed Mellenger	Water detection 7	n/a	Digital	0 to +5V	1/sec	instantaneous	0 to +5V	100mV	6-bit	5%		Is there moisture in the battery case
Ed Mellenger	Water detection 8	n/a	Digital	0 to +5V	1/sec	instantaneous	0 to +5V	100mV	6-bit	5%		Is there moisture in the battery case
Ed Mellenger	Solar panels (each of four)											
Ed Mellenger	Array Current North	n/a	Analog	0 to 10 A	1/sec	1 hr	TBD	2.5mA	12-bit	0.10%		Current to voltage measurement
Ed Mellenger	Array Current East	n/a	Analog	0 to 10 A	1/sec	1 hr	TBD	2.5mA	12-bit	0.10%		Current to voltage measurement
Ed Mellenger	Array Current South	n/a	Analog	0 to 10 A	1/sec	1 hr	TBD	2.5mA	12-bit	0.10%		Current to voltage measurement
Ed Mellenger	Array Current West	n/a	Analog	0 to 10 A	1/sec	1 hr	TBD	2.5mA	12-bit	0.10%		Current to voltage measurement
Ed Mellenger	Array Voltage North	n/a	Analog	0 to 50 VDC	1/sec	1 hr	0 to 50 VDC	25mV	11-bit	0.10%		
Ed Mellenger	Array Voltage East	n/a	Analog	0 to 50 VDC	1/sec	1 hr	0 to 50 VDC	25mV	11-bit	0.10%		
Ed Mellenger	Array Voltage South	n/a	Analog	0 to 50 VDC	1/sec	1 hr	0 to 50 VDC	25mV	11-bit	0.10%		
Ed Mellenger	Array Voltage West	n/a	Analog	0 to 50 VDC	1/sec	1 hr	0 to 50 VDC	25mV	11-bit	0.10%		
Ed Mellenger	Load resistor (lost potential energy)	n/a	Analog	0 to 16 VDC	1/sec	1hr	0 to 16 VDC	10mV	11-bit	0.10%		simple voltage across a resistor after a 12V zener
Ed Mellenger	Light sensor (PAR or pyrometer)	TBD	Analog or serial?	TBD	TBD	TBD	TBD	TBD	TBD	TBD		Top mounted Hemispheric light meter (Mike Kelley) (Biospherical or LI-COR) Need wavelength parameters.
Ed Mellenger	Wind Turbine											
Ed Mellenger	Load resistor (lost potential energy)	n/a	Analog	0 to 16 VDC	1/sec	1hr	0 to 16 VDC	10mV	11-bit	0.10%		simple voltage across a resistor after a 12V zener
Ed Mellenger	Power Feed (NMC)											
Ed Mellenger	Current	n/a	Analog	0 to 5 A	10/sec	1 hr?	TBD	2mA	12-bit	TBD		Current to voltage measurement
Ed Mellenger	Cable Feed											
Ed Mellenger	Cable Current	n/a	Analog	0 to 1 A	10/sec	1 hr?	TBD	0.25mA	12-bit	TBD		Current to voltage measurement
Ed Mellenger	Cable Voltage	n/a	Analog	0 to 500 VDC	10/sec	1 hr?	0 to 500 VDC	1V	9-bit	0.10%		
Ed Mellenger	Ground fault	n/a	Analog	0 to +5V	interrupt	instantaneous	0 to +5V	5mV	10-bit	0.10%		
Ed Mellenger	Environmental (power housing)											
Ed Mellenger	Pwr Hsg Temp	n/a	Analog	-25 to +75c	1/min	1 hr	TBD	2c	6-bit	1%		
Ed Mellenger	Pwr Hsg Humidity	n/a	Analog	0 to 100%	1/min	1 hr	TBD	5%	5-bit	1%		
Ed Mellenger	Heatsink Temperatures	TBD	TBD	TBD	TBD	TBD	TBD	TBD	n/a	TBD		Future
Ed Mellenger	Controller with data storage											
Ed Mellenger	Pwr Sys Control Functions											
Ed Mellenger	- Batt SOC	n/a	Software	TBD	1/min	TBD	TBD	TBD	n/a	TBD		we are trying "buy" before we "ma (Wait until end of April) software function
Ed Mellenger	- Load Shed (?)	n/a	Software	TBD	1/min	TBD	TBD	TBD	n/a	TBD		based on batt voltage measurement (Wait until end of April) software function decision table "What gets shut down first"
Ed Mellenger	- Peak Pwr Tracking	n/a	Software	TBD	TBD	TBD	TBD	TBD	n/a	TBD		(Wait until end of April) software function
Ed Mellenger	- Dummy Loads											
Ed Mellenger	- 1 W	n/a	Digital	On/Off	1/day?	n/a	n/a	n/a	n/a	n/a		Switches a dummy load resistor in for power consumption modeling
Ed Mellenger	- 2 W	n/a	Digital	On/Off	1/day?	n/a	n/a	n/a	n/a	n/a		Switches a dummy load resistor in for power consumption modeling
Ed Mellenger	- 2 W	n/a	Digital	On/Off	1/day?	n/a	n/a	n/a	n/a	n/a		Switches a dummy load resistor in for power consumption modeling
Ed Mellenger	- 5 W	n/a	Digital	On/Off	1/day?	n/a	n/a	n/a	n/a	n/a		Switches a dummy load resistor in for power consumption modeling
Ed Mellenger	- 10 W	n/a	Digital	On/Off	1/day?	n/a	n/a	n/a	n/a	n/a		Switches a dummy load resistor in for power consumption modeling
Ed Mellenger	- 20 W	n/a	Digital	On/Off	1/day?	n/a	n/a	n/a	n/a	n/a		Switches a dummy load resistor in for power consumption modeling
Mark Chaffey	Heave Wave sensor	12-14 VDC @ 45mA	Serial									Triaxys
Mark Chaffey	• Spectral Analysis Statistics	n/a		TBD	TBD	TBD	TBD	TBD	n/a	2%		
Mark Chaffey	• Significant Wave Height (Hmo)	n/a	n/a	TBD	TBD	TBD	TBD	TBD	n/a	2%		
Mark Chaffey	• Peak Period (Tp, Tp5)	n/a	n/a	TBD	TBD	TBD	TBD	TBD	n/a	2%		
Mark Chaffey	• Mean Spectral Period (Tz)	n/a	n/a	TBD	TBD	TBD	TBD	TBD	n/a	2%		
Mark Chaffey	• Zero Crossing Statistics	n/a	n/a	TBD	TBD	TBD	TBD	TBD	n/a	2%		
Mark Chaffey	• Significant Wave Height (Hs)	n/a	n/a	TBD	TBD	TBD	TBD	TBD	n/a	2%		
Mark Chaffey	• Maximum Wave Height (Hmax)	n/a	n/a	TBD	TBD	TBD	TBD	TBD	n/a	2%		
Mark Chaffey	• Height of Highest 10% of Waves (H10)	n/a	n/a	TBD	TBD	TBD	TBD	TBD	n/a	2%		
Mark Chaffey	• Average Wave Height (Hav.)	n/a	n/a	TBD	TBD	TBD	TBD	TBD	n/a	2%		
Mark Chaffey	• Average Wave Period (Tav.)	n/a	n/a	TBD	TBD	TBD	TBD	TBD	n/a	2%		
Mark Chaffey	• Average Period of H10 (T10)	n/a	n/a	TBD	TBD	TBD	TBD	TBD	n/a	2%		
Mark Chaffey	• Significant Wave Period (Ts)	n/a	n/a	TBD	TBD	TBD	TBD	TBD	n/a	2%		

Mark Chaffey	Zero Crossings	n/a	n/a	TBD	TBD	TBD	TBD	TBD	n/a	2%		
Mark Chaffey	• Power (non-directional) Spectra	n/a	n/a	TBD	TBD	TBD	TBD	TBD	n/a	2%		
Mark Chaffey	Energy for Each Frequency Band	n/a	n/a	TBD	TBD	TBD	TBD	TBD	n/a	2%		
Mark Chaffey	buoy tension load cell (strain guage)	n/a	Analog	TBD	4 Hz	TBD	TBD	TBD	n/a	TBD	Yes	Wheatstone bridge - voltage measurement (measuring axial strain)
Mark Chaffey	Environmental											METSYS or ASIMET or other?
Ed Mellenger	Ambient Air Temp	n/a	Analog	-25 to +75c	1/min	1 hr	TBD	2c	6-bit	1%		
Ed Mellenger	Windspeed	TBD	TBD	TBD	TBD	TBD	TBD	TBD	n/a	TBD		M2? Or METSYS?
Mark Chaffey	compass	8-18 VDC @ 40mA.	Serial	current heading 0-360, turns +/- 100	1/sec	1 min	current heading 0-360, turns +/- 100	0.5 deg	n/a	1 deg		
Lance McBride	Turns indicator	n/a	Software									integrate the compass heading. +1 for every pass of 360...
Lance McBride	MBARI wireless comms (VHF, Freewave, satellite, etc.)											
Lance McBride	- Satellite (Iridium, Orbcomm, Globalstar)	TBD	Serial	N/A	N/A	N/A	N/A	N/A	n/a	N/A		Over the horizon comms
Lance McBride	- Link strength	n/a	Software	0 to +50dbm	1/min	4/hr	0 to +50dbm	0.1dbm	n/a	1%		Accurate report of link margin
Lance McBride	- Terrestrial (Freewave, Neumodem)	TBD	Serial	N/A	N/A	N/A	N/A	N/A	n/a	N/A		Bay area comms
Lance McBride	- Link strength	n/a	Software	0 to +50dbm	1/min	4/hr	0 to +50dbm	0.1dbm	n/a	1%		Accurate report of link margin
Lance McBride	- Local (BT console)	TBD	Serial	N/A	N/A	N/A	N/A	N/A	n/a	N/A		Ship to buoy comms
Lance McBride	- ARGOS transponder (ELT)	TBD	Serial	N/A	N/A	N/A	N/A	N/A	n/a	N/A		SEIMAC SMART CAT III, Sat Comms
Lance McBride	GPS	TBD	Serial	-180..+180N/S, -180..+180E/W	1/min	1/10min	-180..+180N/S, -180..+180E/W	0.0001deg	n/a	100m		Are we implementing the 1ms (?) timing accuracy
Lance McBride	Pager (reset)	TBD	2-wire differential	N/A	interrupt	instantaneous	n/a	n/a	n/a	n/a		Satellite (?) reset for processor wakeup
Lance McBride	Scott's PIC sensor board?											
Lance McBride	ground fault	n/a	Digital	0 or +5V	interrupt	instantaneous	0 or +5V	n/a	n/a	n/a		
Lance McBride	moisture detection	n/a	Digital	0 or +5V	interrupt	instantaneous	0 or +5V	n/a	n/a	n/a		
Riser cable												
no monitoring												
Benthic side												
Mark Chaffey	anchor tension load cell (strain gauge)	n/a	Analog	TBD	4 Hz	TBD	TBD	TBD		TBD		Wheatstone bridge - voltage measurement (measuring axial strain)
Lance McBride	locator beacon, "homer" (contact Mike Conway 1wk prior to deployment)	TBD	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		Sonic location beacon (self-powered)
Lance McBride	BIN (repeater for power/comms cable monitoring)											
Lance McBride	Controller											
Lance McBride	low data-rate communication	TBD	Serial	Link functional/not-functional	1kHz	1/hr	Link functional/not-functional	n/a	n/a	n/a		BER?
Lance McBride	severed cable detection	n/a	Software	Severed/Not-severed	1kHz	1/hr	Severed/Not-severed	n/a	n/a	n/a		Software function - monitor top/bottom strain gauge and comm. Ping to correlate time event (implies bottom storage).
Ed Mellenger	Cable Voltage	n/a	Analog	0 to 500 VDC	10/sec	1 hr?	0 to 500 VDC	1V	9-bit	0.10%		Not there for August deployment (requires further discussion)
Ed Mellenger	- Dummy Loads											
Ed Mellenger	- 1 W	n/a	Digital	On/Off	1/day?	n/a	n/a	n/a	n/a	n/a		Switches a dummy load resistor in for power consumption modeling
Ed Mellenger	- 2 W	n/a	Digital	On/Off	1/day?	n/a	n/a	n/a	n/a	n/a		Switches a dummy load resistor in for power consumption modeling
Ed Mellenger	- 2 W	n/a	Digital	On/Off	1/day?	n/a	n/a	n/a	n/a	n/a		Switches a dummy load resistor in for power consumption modeling
Ed Mellenger	- 5 W	n/a	Digital	On/Off	1/day?	n/a	n/a	n/a	n/a	n/a		Switches a dummy load resistor in for power consumption modeling
Ed Mellenger	- 10 W	n/a	Digital	On/Off	1/day?	n/a	n/a	n/a	n/a	n/a		Switches a dummy load resistor in for power consumption modeling
Ed Mellenger	- 20 W	n/a	Digital	On/Off	1/day?	n/a	n/a	n/a	n/a	n/a		Switches a dummy load resistor in for power consumption modeling
Lance McBride	Scott's PIC sensor board?											
Lance McBride	ground fault	n/a	Digital	0 or +5V	interrupt	instantaneous	0 or +5V	n/a	n/a	n/a		
Lance McBride	moisture detection	n/a	Digital	0 or +5V	interrupt	instantaneous	0 or +5V	n/a	n/a	n/a		
			Total Analog	33	Maximum Resolution							
			Total Digital	24								
			Total Serial	8								