

|                                                                                   |                                                                                                        |                                                         |                                                                                                                                                                                    |                        |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Spreadsheet                                                                       |                                                                                                        | Interfaces on the initial (engineering) MOOS deployment |                                                                                                                                                                                    | Copyright © 2002 MBARI |
|  | <p>Monterey Bay Aquarium Research Institute<br/>7700 Sandholdt Rd.<br/>Moss Landing, CA 95039-9644</p> |                                                         | <p><b>Drawn by:</b> Lance McBride</p>                                                                                                                                              |                        |
|                                                                                   |                                                                                                        |                                                         | <p><b>Date:</b> 6/5/2002</p>                                                                                                                                                       |                        |
|                                                                                   |                                                                                                        |                                                         | <p><b>Doc. #:</b> 1001474</p>                                                                                                                                                      |                        |
|                                                                                   |                                                                                                        |                                                         | <p><b>Rev.:</b> C.5</p>                                                                                                                                                            |                        |
|                                                                                   |                                                                                                        |                                                         | <p>All information here is considered proprietary and may not be copied, duplicated, or transmitted without the express permission of Monterey Bay Aquarium Research Institute</p> |                        |

| 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<br>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                      | Analogue         | 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         | ADC 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                      | Analogue         | 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         | ADC 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                      | Analogue         | 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         | ADC 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                      | Analogue         | 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         | ADC 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              | DIO via DPA      | Turns on the current sensors prior to take current measurements                                        |
| Mike Risi            | Ed Mellenger  | Battery Current 1                                      | n/a                      | Analogue         | 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         | ADC via DPA      | Current to voltage measurement                                                                         |
| Mike Risi            | Ed Mellenger  | Battery Current 2                                      | n/a                      | Analogue         | 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         | ADC via DPA      | Current to voltage measurement - leave if we can                                                       |
| Mike Risi            | Ed Mellenger  | Battery Current 3                                      | n/a                      | Analogue         | 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         | ADC via DPA      | Current to voltage measurement - leave if we can                                                       |
| Mike Risi            | Ed Mellenger  | Battery Current 4                                      | n/a                      | Analogue         | 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         | ADC via DPA      | Current to voltage measurement - leave if we can                                                       |
| Mike Risi            | Ed Mellenger  | Battery Current 5                                      | n/a                      | Analogue         | 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         | ADC via DPA      | Current to voltage measurement - leave if we can                                                       |
| Mike Risi            | Ed Mellenger  | Battery Current 6                                      | n/a                      | Analogue         | 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         | ADC via DPA      | Current to voltage measurement - leave if we can                                                       |
| Mike Risi            | Ed Mellenger  | Battery Current 7                                      | n/a                      | Analogue         | 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         | ADC via DPA      | Current to voltage measurement - leave if we can                                                       |
| Mike Risi            | Ed Mellenger  | Battery Current 8                                      | n/a                      | Analogue         | 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         | ADC via DPA      | Current to voltage measurement - leave if we can                                                       |
| Mike Risi            | Ed Mellenger  | Battery Voltage                                        | n/a                      | Analogue         | 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         | ADC via DPA      |                                                                                                        |
| Mike Risi            | Ed Mellenger  | Water detection 1                                      | n/a                      | Analogue         | 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   | ADC via DPA      | Is there moisture in the battery case                                                                  |
| Mike Risi            | Ed Mellenger  | Water detection 2                                      | n/a                      | Analogue         | 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   | ADC via DPA      | Is there moisture in the battery case                                                                  |
| Mike Risi            | Ed Mellenger  | Water detection 3                                      | n/a                      | Analogue         | 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   | ADC via DPA      | Is there moisture in the battery case                                                                  |
| Mike Risi            | Ed Mellenger  | Water detection 4                                      | n/a                      | Analogue         | 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   | ADC via DPA      | Is there moisture in the battery case                                                                  |
| Mike Risi            | Ed Mellenger  | Water detection 5                                      | n/a                      | Analogue         | 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   | ADC via DPA      | Is there moisture in the battery case                                                                  |
| Mike Risi            | Ed Mellenger  | Water detection 6                                      | n/a                      | Analogue         | 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   | ADC via DPA      | Is there moisture in the battery case                                                                  |
| Mike Risi            | Ed Mellenger  | Water detection 7                                      | n/a                      | Analogue         | 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   | ADC via DPA      | Is there moisture in the battery case                                                                  |
| Mike Risi            | Ed Mellenger  | Water detection 8                                      | n/a                      | Analogue         | 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   | ADC 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                      | Analogue         | 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         | ADC via DPA      | Current to voltage measurement                                                                         |
| Mike Risi            | Ed Mellenger  | Array Current East                                     | n/a                      | Analogue         | 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         | ADC via DPA      | Current to voltage measurement                                                                         |
| Mike Risi            | Ed Mellenger  | Array Current South                                    | n/a                      | Analogue         | 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         | ADC via DPA      | Current to voltage measurement                                                                         |
| Mike Risi            | Ed Mellenger  | Array Current West                                     | n/a                      | Analogue         | 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         | ADC via DPA      | Current to voltage measurement                                                                         |
| Mike Risi            | Ed Mellenger  | Array Voltage North                                    | n/a                      | Analogue         | 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         | ADC via DPA      |                                                                                                        |
| Mike Risi            | Ed Mellenger  | Array Voltage East                                     | n/a                      | Analogue         | 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         | ADC via DPA      |                                                                                                        |
| Mike Risi            | Ed Mellenger  | Array Voltage West                                     | n/a                      | Analogue         | 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         | ADC via DPA      |                                                                                                        |
| Mike Risi            | Ed Mellenger  | Array Voltage South                                    | n/a                      | Analogue         | 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         | ADC via DPA      |                                                                                                        |
| Mike Risi            | Ed Mellenger  | Load resistor (lost potential energy)                  | n/a                      | Analogue         | 0 to 16 VDC                          | 10mV              | 0.10%                      | 11-bit                 | 1/sec                     | 1 hr          | 1 hr          | 1 hr          | 12-bit                                                 | 10V | 2.441mV | Linear Scale        | 0 to 16 VDC                          | Log/Send         | ADC via DPA      | simple voltage across a resistor after a 12V zener                                                     |
| Mike Risi            | Ed Mellenger  | Light sensor (PAR or pyrometer)                        | n/a                      | Analogue         | TBD                                  | TBD               | TBD                        | TBD                    | TBD                       | TBD           | TBD           | TBD           | 12-bit                                                 | 10V | 2.441mV | TBD                 | TBD                                  | Log/Send         | ADC 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                      | Analogue         | 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         | ADC 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                      | Analogue         | TBD                                  | 2mA               | TBD                        | 12-bit                 | 10/sec                    | 1hr           | 1hr           | 1hr           | 12-bit                                                 | 10V | 2.441mV | Linear Scale        | 0 to 5 A                             | Log/Send         | ADC via DPA      | Current to voltage measurement                                                                         |
| Mike Risi            | Ed Mellenger  | Cable Feed                                             |                          |                  |                                      |                   |                            |                        |                           |               |               |               |                                                        |     |         |                     |                                      |                  |                  |                                                                                                        |
| Mike Risi            | Ed Mellenger  | Cable Current                                          | n/a                      | Analogue         | TBD                                  | 0.25mA            | TBD                        | 12-bit                 | 10/sec                    | 1hr           | 1hr           | 1hr           | 12-bit                                                 | 10V | 2.441mV | Linear Scale        | 0 to 1 A                             | Log/Send         | ADC via DPA      | Current to voltage measurement                                                                         |
| Mike Risi            | Ed Mellenger  | Cable Voltage                                          | n/a                      | Analogue         | 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         | ADC via DPA      |                                                                                                        |
| Mike Risi            | Ed Mellenger  | Ground fault                                           | n/a                      | Analogue         | -1mA to +1mA                         | 5mV               | 0.10%                      | 10-bit                 | interrupt                 | instantaneous | instantaneous | instantaneous | 12-bit                                                 | 10V | 2.441mV | Linear Scale        | 0 to +5V                             | Log/Send/Event   | ADC via DPA      |                                                                                                        |
| Mike Risi            | Ed Mellenger  | Environmental (power housing)                          |                          |                  |                                      |                   |                            |                        |                           |               |               |               |                                                        |     |         |                     |                                      |                  |                  |                                                                                                        |
| Mike Risi            | Ed Mellenger  | Pwr Hsg Temp                                           | n/a                      | Analogue         | 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         | ADC via DPA      |                                                                                                        |
| Mike Risi            | Ed Mellenger  | Pwr Hsg Humidity                                       | n/a                      | Analogue         | TBD                                  | 5%                | 1%                         | 5-bit                  | 1/min                     | 1 hr          | 1 hr          | 1 hr          | 12-bit                                                 | 10V | 2.441mV | ???                 | 0 to 100%                            | Log/Send         | ADC 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, Tps)                                  |                          |                  | 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 gauge)                  | n/a                      | Analogue         | not specified                        | not specified     | TBD                        | TBD                    | 4sec                      | TBD           | TBD           | TBD           | 12-bit                                                 | 10V | 2.441mV | TBD                 | TBD                                  | Log/Send         | ADC 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                      | Analogue         | 1-40dbm                              | 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         | ADC 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         | Serial via DPA   | 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 +360...-1 for every pass of -360...        |
| Mike Risi            | Mark Chaffey  | Fiber Optic Cable Tester ch. 1                         | TBD                      | Analogue         | 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                      | Analogue         | 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                      | Analogue         | 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                      | Analogue         | 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 (indium, 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              | 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                                                                         |
|                      | Lance McBride | - Local (BT console)                                   | n/a                      | N/A              | N/A                                  | N/A               | N/A                        | n/a                    | N/A                       | N/A           | N/A           | N/A           |                                                        |     |         | </                  |                                      |                  |                  |                                                                                                        |