Precision multi-sampler for use with deep-submergence vehicles

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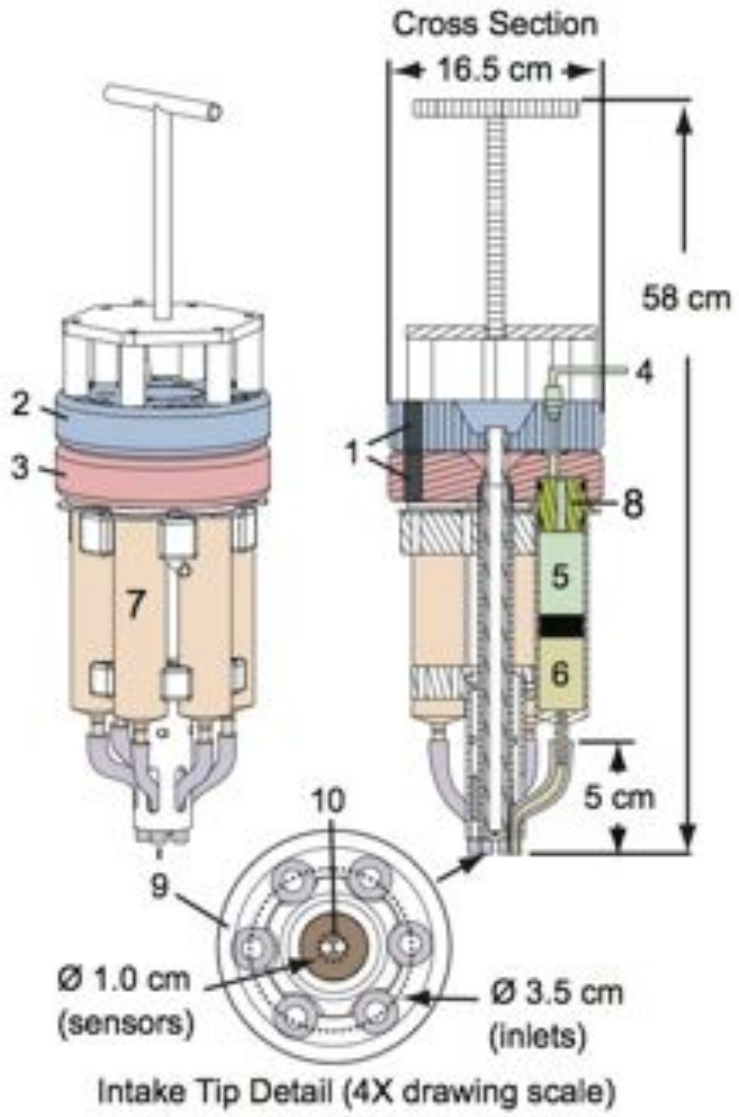
Basic Premise:
A sampler designed to collect discrete microbial samples with high spatial resolution (X,Y, & Z) with minimal cross contamination between samples, and that would include sensors for T° and O_2 at the sampler interface. Sampler design to be compatible cross-platform between deep-sea vehicles, and capable of efficient sample turnaround using ROV *Jason2*.

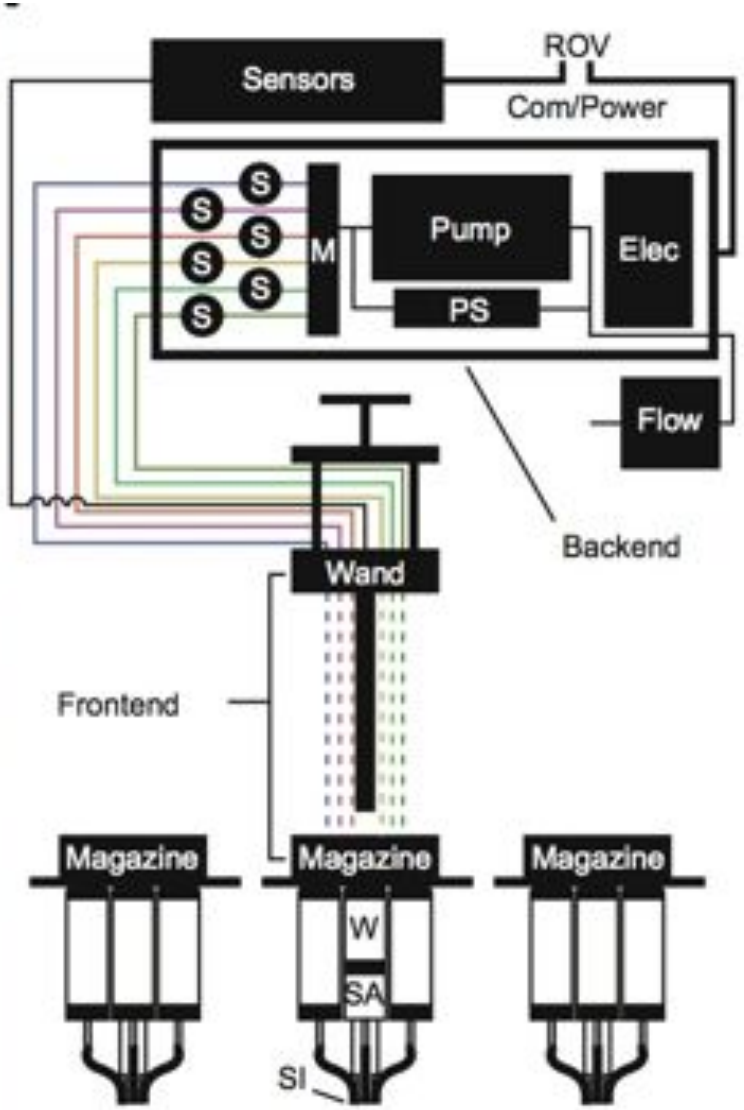
Sampler design and implementation supported by a collaborative NSF OTIC grant proposal between Emerson & Breier, funded in 2009.

Diagram of working end of sampler



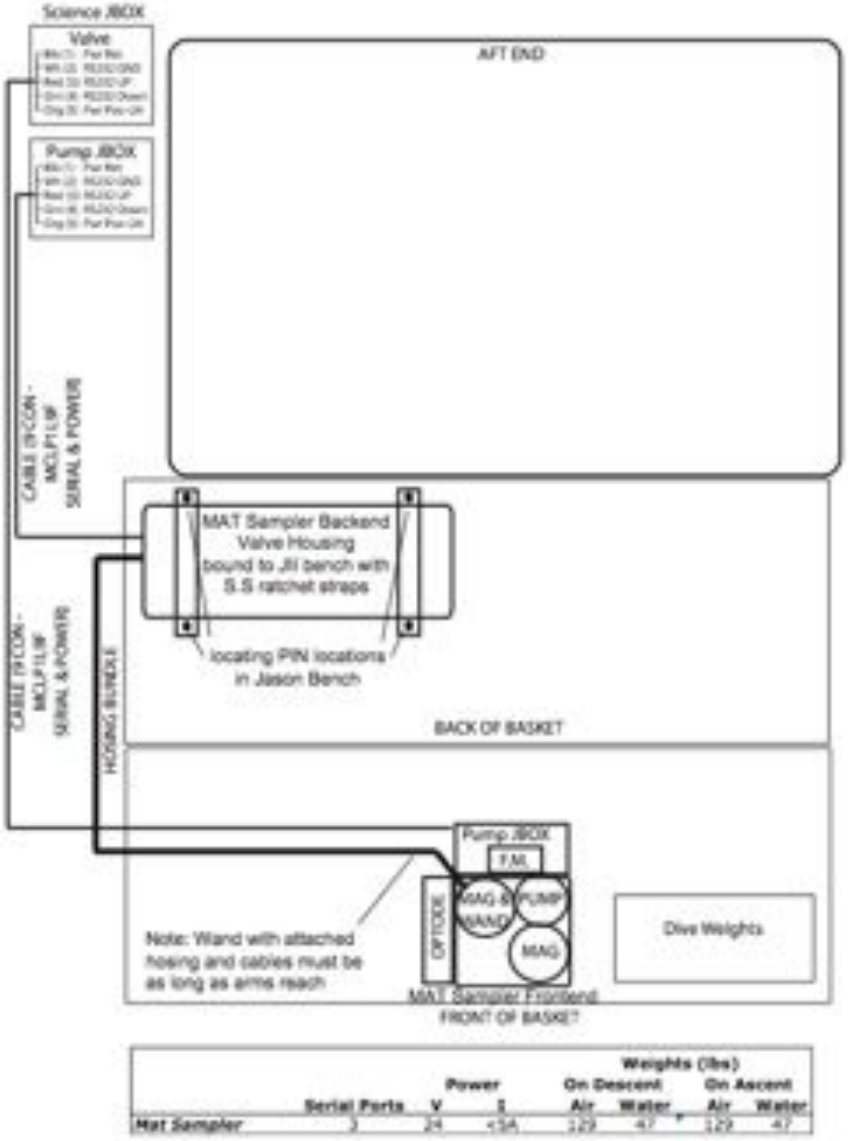
Breier et al, DSR 2012

Components



Breier et al, DSR 2012

ROV *Jason2* – basket layout w/sampler

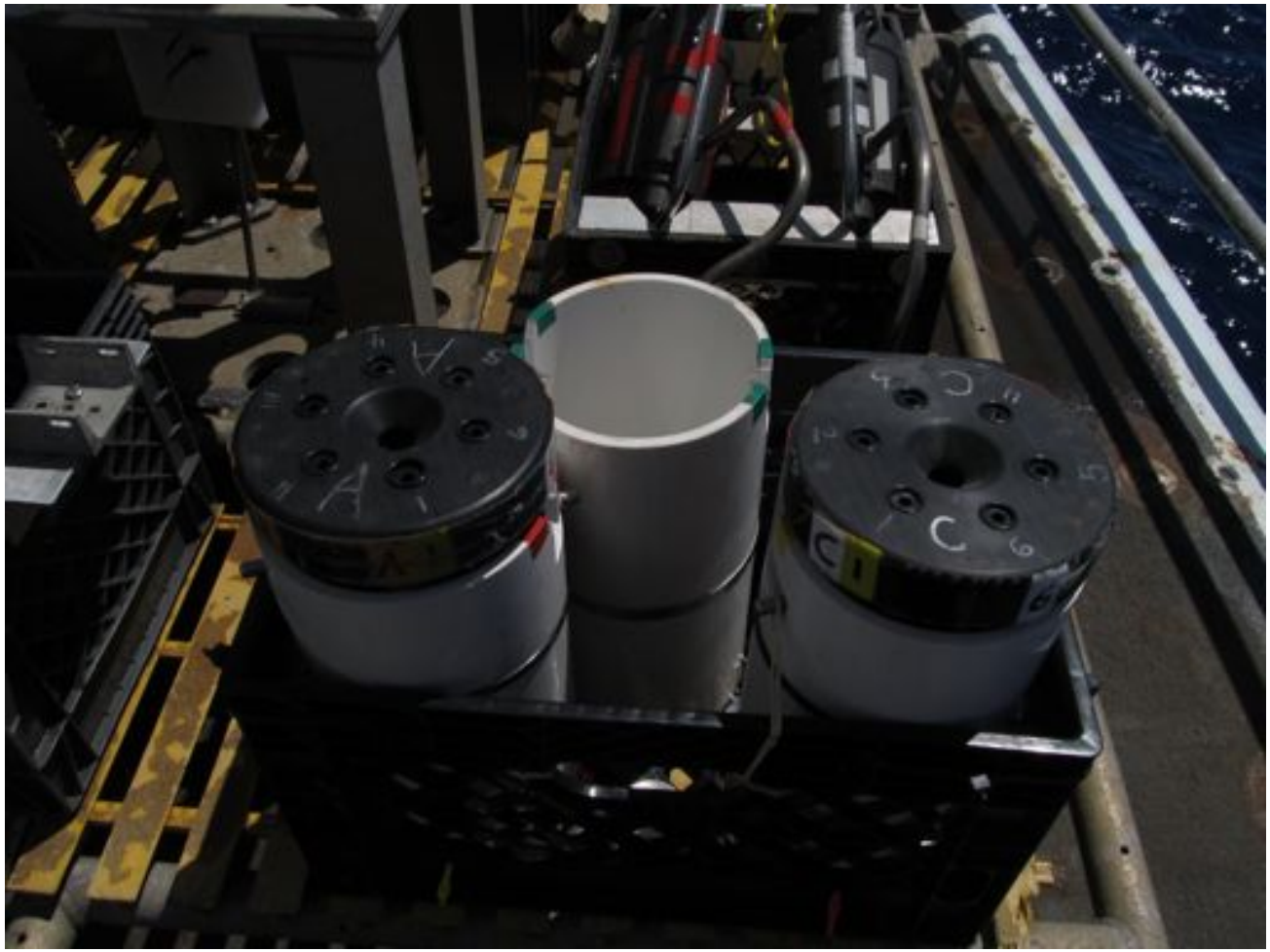


		Power		Weights (lbs) On Descent		On Ascent	
	Serial Ports	V	I	Air	Water	Air	Water
Mat Sampler	3	24	<5A	129	47	129	47

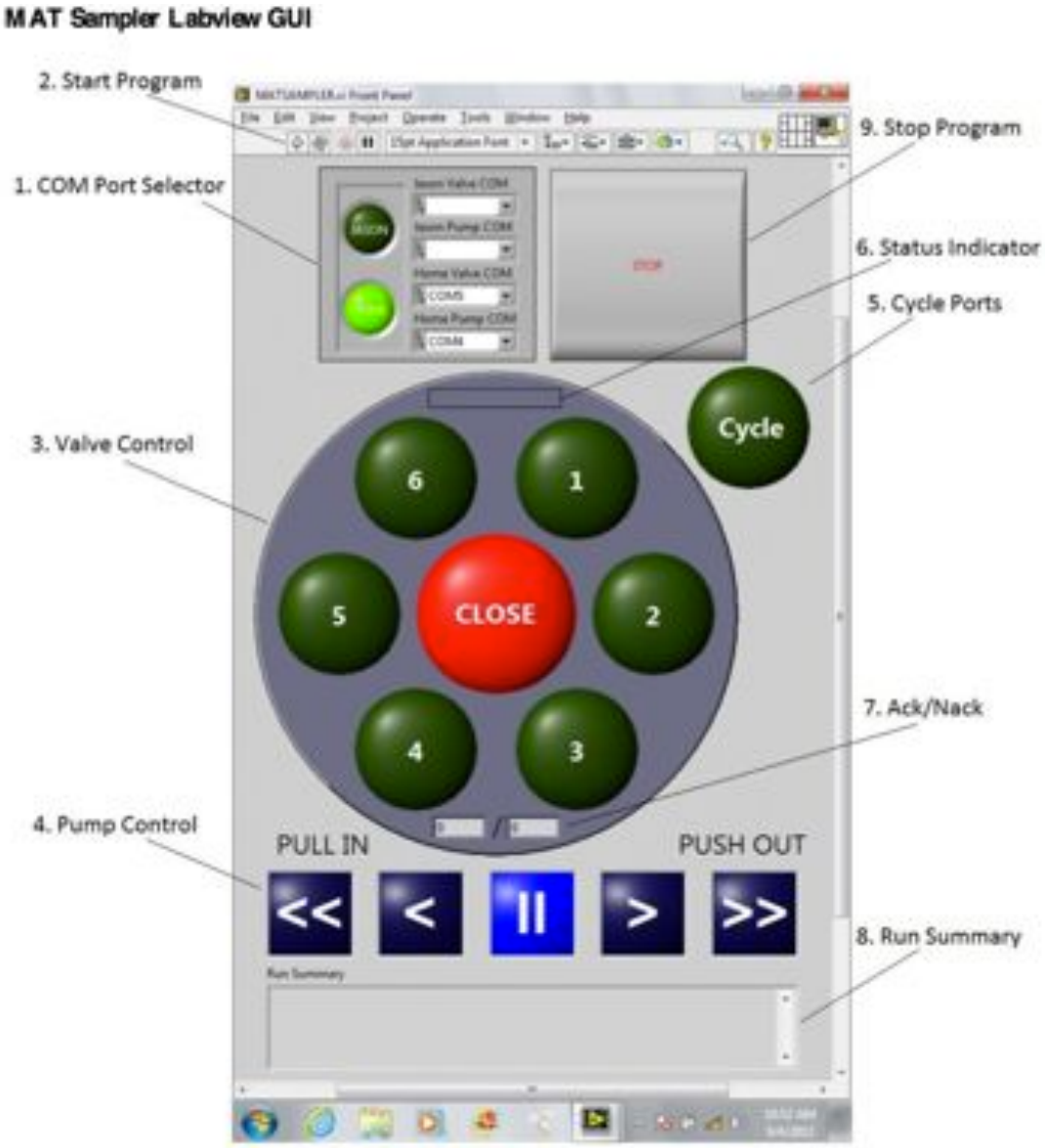
Cassettes ready for deployment


AIS

Elevator crate for additional cassettes



Control Interface – Tablet Computer



Different sampler configurations

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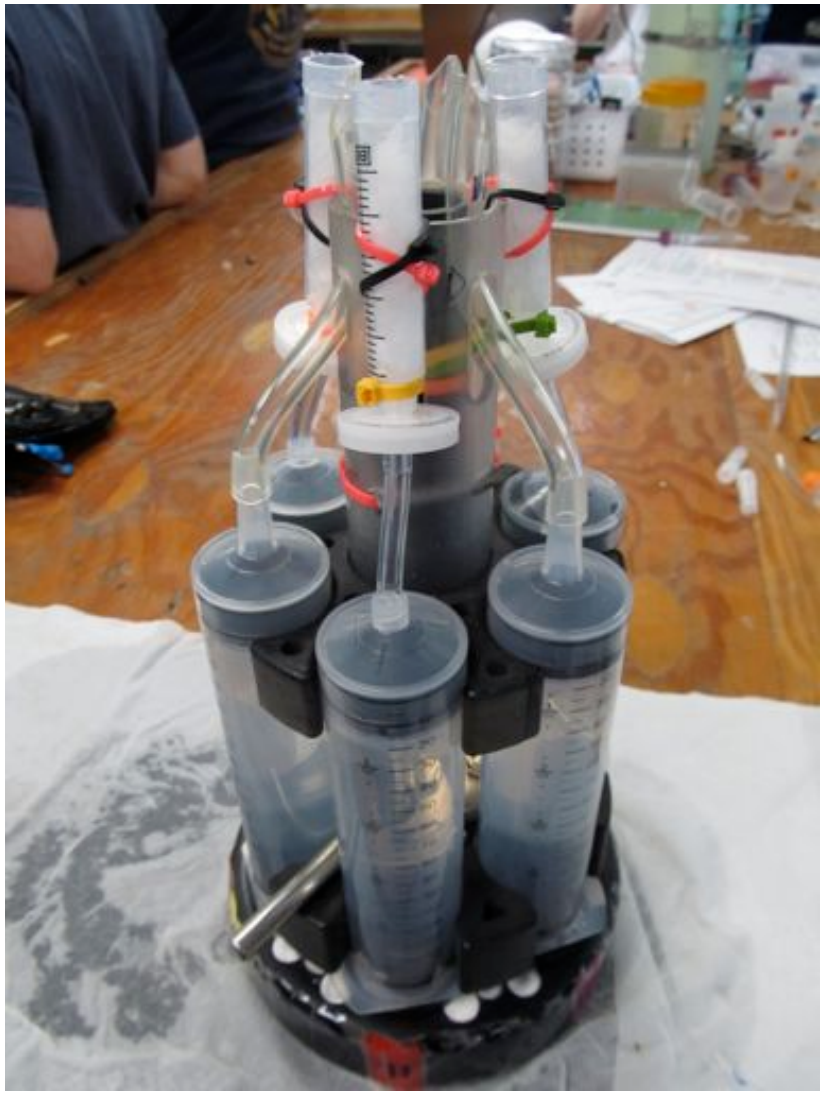
Porewater Sampler



Summary of Deployments.

January 2012, Mid-Caymen Rise, vent fluids & microbial mats (max depth, 4988m)

October, 2012, Mid-Atlantic Ridge, microbial mats (max depth, approx. 3600m)

March, 2013, Loihi Seamount, microbial mats & porewaters (max depth, 4980m)

Summary of Usages.

• Microbial mat sampler: Microbial iron mats & streamers

• In situ sample preservation, e.g. collection of mat samples into syringes pre-filled with RNALater

• Concentrated vent fluids, collected on a syringe

• Porewater sampler, collecting 0.2μm filtered porewater directly from within mat

Proposed usages:

• Collecting particles from the water column

• Collection of meiofauna

• Tracer addition.

User Community.

- Microbiologists

- Biogeochemists

- Others – biologists, physical oceanographers

What NDSF/ROV Jason2 would provide (as currently configured):

- Sampler Unit:
  - 'Backend': Valve unit w/electronics in pressure housing
  - 'Frontend': Pump, jbox, wand, cassettes
- Set-up of sampler on basket
  - Integration into Jason comms
- Control interface – laptop computer in Jason van
- Sampling cassettes – 4 total
- Milk crate for holding cassettes on elevator

Users responsibility:

- Disposable Syringes or other sampling devices
- Assembly and disassembly of cassettes
- QC of cassettes & delivery to J2 prior to pre-dive or elevator ops.

Pre-dive checklist:

- Operation of pump and valve unit coupled to cassette.

Modifications.

- Minimization of pump/valve/electronics

- Options:
    - placement of ‘backend’ on J2 undercarriage
    - consolidation of components into a single operational package

- Add temperature sensor