

Project Number: 902712

Project Start: Jan. 1, 2027

Project Duration (in years): 3

Project Title: **Ventana FO Can Replacement
and Upgrade**

Project Manager:	DJ Osborne
Principal Investigator:	Knute Brekke
Lead Scientist:	Paul Roberts
Lead Engineer:	Chad Kecy

Note: Not all projects require entries for each title. Please only indicate individuals for titles appropriate for your project. Definitions for each position are found in the instructions for internal 2027 proposals.

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1) PROPOSAL (all projects)

Is this a feasibility study [<100 days (800 hours) of total labor requested]?

☐ Yes

☒ No

Abstract or Background

Please provide a copy of the project abstract or background information. Please be sure to address: What fundamental problem does this project address? What makes this work relevant to MBARI (see our [Strategic Roadmap Priorities and Challenges](#)) and the Packard Foundation? Where does this work fit into the ~5–10 year plan for your group, at MBARI, and in the field?

Abstract/background narrative: Please see attached the abstract submitted previously. The engineering team has met since the abstract proposal to discuss the project in more detail, estimate labor hours and input design ideas towards generating a budget.

Select relevant challenges in the table below, and complete the narrative in the space provided above.

Strategic Priorities and Challenges					
<i>Innovate and Build</i>		<i>Explore and Protect</i>		<i>Inspire and Engage</i>	
Build scalable technologies to improve ocean health assessments	☐	Explore and observe life in a dynamic ocean	☐	Share what we learn to inspire and inform ocean conservation	☐
Map the deep seafloor at high resolution	☐	Study the impacts of climate change and other ocean threats	☐	Make ocean science and engineering careers accessible to all	☐
Advance ocean-based artificial intelligence	☐			Invest in our people and foster a diverse and inclusive workforce	

Does this activity relate to one or more 2027 proposals your team is submitting?

Is this effort linked to other internal or externally funded projects or collaborative efforts? If you plan to submit more than one Phase I proposal (internally or externally funded), please provide a list of those projects by Project or DQ#, and please make clear how this project relates to the others you plan to submit and where it ranks in your overall priorities. Does this proposal take precedent over other ongoing or planned activities? Please complete the tables as indicated, and provide any additional text in the space below. (Add more rows as needed.)

Project #	Project Name	Start Year	End Year	Priority (1, 2, 3, etc.)
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Add additional details here, as needed:

[Click here to enter text]

Continuing Projects Only: Status Report

Provide a brief update of the current project relative to what was proposed for 2026. If the project includes multiple subprojects(or milestones), please list each under a subheading as you deem appropriate.

Current status of project to date, including results and any significant changes from the previous project proposal

[Click here to enter text]

What percentages of labor and budget have been used through the 1st half of year?

[Click here to enter text]

Will you complete the current year's scheduled work?

[Click here to enter text]

List the last three peer-reviewed publications and/or other significant products, data sets, education and/or outreach activities, and similar activities that have resulted directly from this project? Please be brief.

[Click here to enter text]

All Projects: Major Activities for 2027

Research and/or Engineering Plans

Please provide an outline of research activities and/or engineering development plans (WBS, schedule, design, design reviews, manufacturing, prototyping, I&T, test deployments). Milestones—significant events in the timeline of a project useful for tracking progress—should be referenced here and included in the milestone chart below, as appropriate for your project. Include a maximum of five milestones.

The first phase of this project would officially start in Jan 2027. We will plan to begin the process of identifying the technology we hope to implement to meet the FO Can functional requirements during 1/2Q2027. The functional requirements will be documented and identified prior during the 3-4Q2026.

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Ideally by end of 2-3Q2027, the design will be mostly finalized and we would be able to start purchasing connectors, housing raw material, Mux hardware, etc and start the fabrication of the pressure housing and internal electronics before year end, 2027. Once the pressure housing is complete and the connectors installed we would do pressure testing prior to population of internals.

Specific Deliverables

Please briefly describe the anticipated deliverables (e.g., applications / tools, datasets, products) for the project.

On the mechanical side of things, we will have the housing and endcaps fabricated. The bulkhead connectors will be attached to the endcap and will have been populated with appropriate wires.

Electrically, we will have decided on the architecture early in the year. The actual design and build of the board sets (power/comm switching and bus backplane) will be complete by the end of the year as well. Various other COTS (commercial off the shelf) parts will be purchased as well.

Field programs (detail ship requirements/other asset deployments/diver requirements)

In addition to describing anticipated field programs, please explain clearly all requirements for shared assets, platforms, and equipment (Dorado AUVs, LRAUVs, Wave Glider, MiniROV, etc.) for each proposed field program.

Asset resource requests must also be entered in the budget entry system. Note that AUV deployment numbers and diver requirement questions are also included in the [Compliance and Planning Considerations Form](#) described at the end of this proposal form.

Ventana would require an offshore dive day on the Rachel Carson to at least 1500 meters to test the new system once complete - estimated 2029/2030. The test dive would happen after the ship had returned from the yard and before any ROV science dives are scheduled.

Milestones and required personnel (see [personnel classification list](#) for Engineering and DMO staff classifications)

Please complete the milestone chart as necessary for your project. The milestone chart must clearly account for all of the shared labor resources required, grouped by project milestones. All labor resources listed in the milestone chart must be entered into the [Adaptive accounting system](#). You may use initials for specific individuals.

Please verify that the labor entries in Adaptive match the entries in the milestone chart BEFORE submitting the final proposal.

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2027 Project Start Date: MM/DD/2027	Milestone 1	Milestone 2	Milestone 3	Milestone 4	Milestone 5	Total Resources (in hours) for each resource category for all milestones listed here
Milestone Date	6/2027	12/2027	4/2027	12/2027	12/2027	
Milestone Description	Housing Build and Testing	Endcap population + internal framing	FO Can Architecture Design + new conn assessment	PCB + backplane Design + build	FO Firmware	
Milestone * Priority for 2027 (Rate 1-5)	1	2	1	2	2	
Electrical Engineer			Kecy – 40 Stern – 40 Martin – 40 Roberts - 40	Kecy – 120 Stern – 80		Kecy – 160 Stern – 120 Martin – 40 Roberts – 40
Software Eng- Embedded					Risi - 80	
Software Eng-Info Eng						
Mechanical Engineer	Hamilton – 60 Tucker - 60					Hamilton -60 Tucker - 60
Mechanical Eng-Division						
Mechanical Eng-Mfg						
Associate Engineer						
Electrical Tech		200		120		320
Software Tech						
Mechanical Tech		120				120
Machinist	Thompson -200					Thompson - 200
Divers						
Video Lab						

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(Add other categories/rows as needed)						

*E.g., enter a rating of 1 for highest priority, 5 for lowest priority.

Milestones additional description

Housing Build and Testing. We plan to finish an outline of the functional requirements in late 2026 which will help drive the details of the housing and penetration features. Much of the connector requirements have been identified as many of the interfaces to existing infrastructure will not change. The remaining interface details will be driven by further identification of specific hardware to meet the functional requirements. This housing will most likely be Titanium to reduce long term corrosion concerns that have plagued all the previous aluminum builds.

Endcap population and internal framing. Once the endcap is populated and the internal framework is complete the can will be pressure tested at Port Hueneme. No electronics are planned to be installed during this time. The early build of the pressure vessel allows a longer design timeline for the internal boards and electronics.

FO Can Architecture Design and Fiber connector assessment. The functional requirements and wiring netlist for existing interfaces will define much of the internal switching needs for the design. There will be some additional infrastructure added for some future proofing of the can interfaces. We have already begun looking at options for a more robust, affordable, rebuildable and modular fiber optic interface. There are multiple options for this functionality and we are working our way thru the different manufacturers this year.

PCB blackplane, switching card and FO micro design After two initial discussions the most popular path forward was a new backplane board, a new 3 or 4 channel switching card and a modernized FO

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micro card. After the specifications for the new FOCAL 907X mux become available from MOOG we will have a more defined outline of the features that need to be incorporated into the new system.

FO Firmware and Vehicle interface testing. GSS has been asked the question about supporting the existing FO micro software or switching to a standard WAGO module interface. Either option is likely supportable without major software changes to the GSS control system or topside electronics. At this time it is believed that the changes from GSS will be relatively minimal and would be covered in the routine every-other to ever-other-other year visits to provide OS updates, module improvements, bug fixes and light upgrade requests.

Budget justification

Enter budgets in the [Adaptive accounting system](#) and provide descriptions and justification for each request in the system. Label each expense description in Adaptive with an identifier (e.g., Milestone 1: Materials for EM Cable Terminations \$4,000). If details in Adaptive are tied to specific tasks, then no further justification is required. If budget requests are not explained in Adaptive, please add more detail here.

The totals for each budget request and category detailed here must match the totals entered in Adaptive. Please verify BEFORE submitting the final proposal.

Ventana FO Can Replacement budget				
item	description	qty	cost per	total
Ti	Ti round for entire can raw materials	599	35	25158
Focal Mux 907x	next Generation MUX from Focal	1	1	75000
CWDM	Color Cube CWDM for telemetry fiber	4	2000	8000
Vicors	various AC/DC and DC/DC	10	400	4000
Connectors	Various Scorpion/Seacon penetrations	24	850	20400
Micro card redo	replace a few obsolete components or finish existing	4	500	2000
video switch card redo	reengineer the old card with non obsolete components	4	600	2400
backplane card redo	reengineer the card and produce/stuff them	6	1000	6000
video isolation card redo	redo with non obsolete parts	2	600	1200
misc electronics	hubs, switches, AC relays	4	1000	4000
fiber optics	bulkheads, cables, whips	5	3000	15000
FOCAL Mux DWDM for 10db more overhead		1		40000
Fiber optic	ISE fiber harness, 1 atm to oil filled penetration	1	8000	8000
pressure vessel testing and shipping	Port Hyunme	1	4000	4000
new HDSDI cameras to replace NTSC	hardware to support new system features			16500
unknown	Misc, increase in prices, FO penetrations, Ti price inc.		20000	20000
		Totals		251658
		with Spares		

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Project team

Specify internal and external collaborators.

DJ Osborne – Project Manager
Knute Brekke – Principal Investigator
Paul Roberts – Lead Scientist
Chad Kacey – Lead Engineer, EE
Bryan Touryan-Schaefer, DMO ET
George Stern - EE
Eric Martin - EE
Michael Risi - SE
Andrew Hamilton - ME
Justin Tucker - ME

External consultants/contractors

Long-Term Planning Considerations

Please describe any commitments on internally or externally funded projects that have implications beyond 2027. This could include commitments of shared assets, labor resources, ship time, international multiyear programs, large-scale expeditions, etc.

[Click here to enter text]

Compliance and Planning Considerations

Not submitted.