UNIVERSITY - NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

UNOLS
DEEP SUBMERGENCE SCIENCE COMMITTEE MEETING

SUMMARY REPORT

September 18, 1996

National Science Foundation
Board Room 1235
4201 Wilson Boulevard
Arlington, VA 22230

Meeting Report

UNOLS DEEP SUBMERGENCE SCIENCE COMMITTEE

Room 1235
National Science Foundation
4201 Wilson Boulevard
Arlington, VA
18 September 1996

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The following minutes represent a summary of the activities and discussions that took place at the DESSC meeting that was held at the National Science Foundation on 18 September, 1996. The meeting followed the agenda, ***Appendix I***, except as noted in these minutes. The attendance list for the meeting has been included as ***Appendix II***.

I. Welcome, Introductory Remarks - Mike Perfit, Deep Submergence Science Committee (DESSC) Chair, called the meeting to order at 10:00 a.m. Mike explained that the meeting was being held to bring DESSC members, the WHOI operator and program managers together to discuss timely and pertinent deep submergence issues. These issues included reviews of the WHOI Deep Submergence Operations Group (DSOG) management operation plan, scheduling of ALVIN/ROVs, ALVIN upgrade plans and SEACLIFF's future.

II. Current Status of ATLANTIS Delivery - Dick Pittenger reported that construction of ATLANTIS is ahead of schedule and may be delivered earlier than its scheduled delivery date of 15 April. Acceptance trials are scheduled for November 1996. WHOI has sold ATLANTIS II. The vessel was remembered in a farewell ceremony at Woods Hole in July. Following the ceremony, A-II transited to New Orleans for removal of the A-frame. The A-frame is being refurbished and will be installed on ATLANTIS.

1996 Field Programs - ROV operations are going very well this year. During Paul Johnson's cruise to the Juan de Fuca Ridge, Jason completed 87 hours of continuous operations on the bottom during one lowering. Jason's elevators were used with great success. Dan Fornari reported that his cruise (LUSTRE '96) this summer to Lucky Strike Seamount on the Mid Atlantic Ridge also went very well. All three vehicles were used; Jason, ARGO and AMS-120. They surveyed a 16 x 10 km section of ridge crest. ***Appendix III*** gives an operational summary of Dan's cruise along with survey samples.

1997-98 DSOG Tentative Schedule and Logistics - Dick Pittenger reviewed the ATLANTIS schedule and post delivery events, see ***Appendix IV***. ATLANTIS is expected to arrive at WHOI in mid-April and ALVIN will be placed on board. After completion of an ATLANTIS/ALVIN demonstration and certification engineering dives, the vessel and sub will be ready for science. Operations are scheduled to begin in early June 1997.

Don Moller continued the report by reviewing the funded ALVIN dive requests for 1997, see ***Appendix V*** for all of Don's view graphs. There are a total of 136 ALVIN dives funded. The BRIDGE/ BBC UK work at Lucky Strike is still being considered, WHOI is preparing a quotation to BRIDGE. There are a total of 180 days-on-station funded for Jason/ARGO/AMS-120. In 1997, the ROVs are currently scheduled to operate in the Western Pacific and Mediterranean. They will visit the site of the wreck of the MV DERBYSHIRE, a vessel which sank in a typhoon in 1980. This is a UK/European funded cruise to perform a forensic survey of the vessel. The DERBYSHIRE cruise will enable ROV Jason (and R/V THOMPSON) to be in the western Pacific where Patty Fryer (U. Hawaii) has an approved NSF-funded cruise that otherwise could not have been efficiently scheduled.

Next, Don showed a timeline of the ROV schedule for 1996/1997 with ship assignments. From September 1996 through October 1997, seven cruises are planned. Time between cruises is needed for shipping the ROVs to their next assignment and on average, the required shipping time is six weeks. During shipping no maintenance can be performed on the vehicles, hence the 1996/97 schedule allows for very little maintenance of ROV systems which could have negative consequences for operations.

WHOI has prepared two schedule options for 1997 ATLANTIS operations. Option A was generally accepted by the UNOLS Ship Scheduling Committee. Under this scenario, ATLANTIS and ALVIN would begin operations in June in the Atlantic. At the end of July, the ship would transit through the Panama Canal and resume operations off San Diego. In the fall, one cruise is planned on the northern EPR to be followed by a series of cruises on the southern EPR. In October, the AMS-120 sonar system will be placed onboard ATLANTIS (integrating ALVIN with the towed vehicles for the first time on the same platform). However, in this scenario the ship must return to San Diego in March 1998 to begin its required Post Shakedown Availability (PSA) period. It was noted that if schedule option A is accepted, and if any additional proposals for SEPR get funded (including NOAA cruises), they would not be able to be scheduled for the early 1998 opportunity since the ship would be required to return to the U.S. to undergo its PSA.

Option B integrates the ROV and ALVIN operations earlier than option A. After completing operations off San Diego in August, ATLANTIS would transit to Juan de Fuca for three Jason cruises. In October, the ship would return to San Diego for one ALVIN cruise to be followed by a Jason cruise at the northern EPR. Option B moves the PSA to January 1998 before conducting operations at the Southern EPR. As a result, any additional proposals that get funded for the SEPR could get scheduled in 1998. Don presented the cruise tracks for options A and B. Both option A and B leave one funded cruise unscheduled at this time; Karson's cruise to Hess Deep.

There was considerable discussion of the two options. Option A, presents a more efficient schedule for the UNOLS fleet as a whole and is the option favored by NSF. Option B would be very disruptive to REVELLE's schedule. Option B, however, is favored by the operator and DESSC since it marries the sub and ROVs earlier and poses less scheduling constraints on the work in the SEPR.

Based on numerous discussions, and how the 1997 operations and science funding works out, it is clear that some hybrid schedule between options A and B should be developed to preserve the scheduling of THOMPSON/REVELLE for Juan de Fuca ROV work in late summer 1997, provide for an open-ended excursion down to the southern EPR, and allow for joint ROV and submersible operations as soon as practical on the new ATLANTIS.

Global Initiatives - Mike Perfit presented world maps showing the areas of interest for ALVIN/ROV operations, see ***Appendix VI***. Interest areas for ALVIN and the ROVs are global and include the Western Pacific, Southern EPR, Mediterranean and Indian Ocean. DESSC has identified global heroes to coordinate programs for these regions.

Patty Fryer, hero for the Western Pacific, reported that she just recently returned from a planning meeting in Japan. JAMSTEC presented their tentative schedule which showed a potential for collaborative work with the U.S. in the Izu-Bonin-Marianas arc. The Japanese are interested in multichannel work in waters deeper than 6500 meters. They have suggested establishing an international center to be funded jointly by the U.S. and Japan. Bob Stern (UT Dallas) should have a workshop report available soon and they will be available on the UNOLS WWW homepage <http://www.gso.uri.edu/unols/unols.html>.

IV. Integrated Deep Submergence Management and Operations Plan -

1. Integration of ALVIN and tethered vehicle personnel - Dick Pittenger reviewed WHOI's proposed concept of operations, see ***Appendix VII*** for all view graphs on this topic. He began by describing the facility which consists of ATLANTIS, ALVIN and the ROVs (ARGO/Medea/Jason/DSL-120). Although ABE is not part of the facility, Dick provided a description of the vehicle. Dick reviewed ATLANTIS' layout and highlighted the deep submergence modifications. He then displayed the lists of the equipment installed on the ship and vehicles. Dick reviewed the Operational Scientific Services (OSS) which consists of the marine technicians, shipboard data management, shared use equipment, calibration facilities, mooring/rigging shop and diving program.

An overview of the WHOI deep submergence organization was provided and included the functional relationships between DESSC, WHOI and funding agencies. It also listed the Deep Submergence Facility (DSF) contacts for shore and at-sea support. WHOI's operation plan centralizes cruise preparation and science liaison. PIs would contact the Marine Operations Coordinator, Don Moller, who in turn would communicate with the appropriate ROV, ALVIN and/or SSSG coordinator(s). The concept proposes a single point of contact. Coordination would stay with the marine operations coordinator through all stages of a cruise. The entire marine operations cruise preparation sequence was reviewed. It begins with assembling funded and proposed deep submergence science work and concludes with cruise demobilization.

The optimum integrated DSOG personnel requirements for both shore and at-sea support were presented. On shore support would consist of 14 people which increases WHOI's present support team by a couple of people. At-sea support was divided into combined ATLANTIS operations and flyaway ROV operations. The combined operations represent those operations in which both ALVIN and the ROVs would be on ATLANTIS. Combined support requirements call for 12 people. The flyaway ROV operations represent the scenario in which ALVIN would be operating off ATLANTIS and the ROVs would be working off another ship. This scenarios requires two support teams. The ATLANTIS/ALVIN team would consist of nine people and the ROV fly-away team would consist of ten people. It was noted that the team sizes include support during personnel vacation time. It was also pointed out that it would be difficult to do simultaneous combined and flyaway ROV operations since an additional van would be needed to support the flyaway ROV operations.

2. Plan for shorebased and shipboard operations - The pros and cons of the various ALVIN/ROV operating modes were discussed. Combined operations with ALVIN and the ROVs on ATLANTIS would be the most cost-effective, efficient asset utilization. The cons would be that it presents limited geographic/temporal coverage. ALVIN on ATLANTIS and the ROVs in fly-away mode would extend the geographic capability; however, it would be more expensive, harder on equipment and personnel, and limit ROV availability due to shipping requirements. Also, there would be an excess of personnel while the ROVs were being shipped between operations. The costs of various operation models were reviewed. Costs were based on ALVIN and the ROVs each costing one half the annual cost of ATLANTIS. The annual ALVIN/ROV joint operations cost is estimated at 2/3 the annual cost of ATLANTIS. Summaries of past ALVIN/AII costs and usage were provided.

3. Operational/Management/Safety Issues - Dick Pittenger continued his report by explaining that there are a number of operational/management/safety issues and policies associated with the integrated facility of which the community needs to be aware. On average, a period of 24 hours is estimated to be needed between suspension of ROV operations and commencement of ALVIN dive operations. Switch-over times for ROV and tethered vehicles are estimated at 12-18 hours for Jason to ARGO-II and vice versa, and 6-12 hours for DSL-120 to either Jason or ARGO-II and vice versa. A definition of the deep submergence tool suite and general operational criteria and logistics must be defined by PIs during the planning stage of their field work. Equipment and personnel will be tailored on a cruise-by-cruise basis. Substitutions of vehicles in the field would be difficult.

Lastly, Dick reviewed the cost and logistical issues of the integrated facility. For cost-effective DSF operations, advanced planning and scheduling are necessary. There would be benefits from operating all DSF vehicles from ATLANTIS for science programs and facility cost-effectiveness. However, there are some logistical and operations benefits to preserving an ROV fly-away capability. Well established protocols between the Federal funding agencies, UNOLS and WHOI would be necessary for the integrated operations. The MOU should be revised to accommodate the new integrated nature of the Facility. Adequate personnel/engineering support and long-range planning for facility upgrades should be factored into its continued support.

The meeting participants agreed that WHOI's concept of operations needs to be distributed to the community. The community needs educating on the new methods. Mike requested the DESSC members to review WHOI's concept of operations and forward any suggestions to Dick or himself. They would like to have the DSF concept of operations revised to reflect DESSC and funding agency comments, and made available to the community and presented at the DESSC meeting in December.

V. Synopses of Ongoing Upgrade and Overhaul Plans:

1. DESSC Upgrade Priorities - Dan Orange provided a history of ALVIN's upgrade and overhaul plans, see ***Appendix VIII.*** In June 1995, the DESSC realized the potential opportunity to upgrade ALVIN systems during its 1996/97 overhaul period. Dan and Cindy Van Dover solicited the community for input, then compiled a prioritized list of ALVIN upgrades. After a series of meetings and discussions with the operator and funding agencies, the list was revised. Dan reviewed the revised list of priorities in order of importance (***Appendix VIII*** includes an explanation of each item):

1. Datalogger/video upgrade
2. Add syntactic foam
3. Power
4. (tie) Obtain dual head scanning sonar
4. (tie) Obtain 4 slurp pumps with chambers
5. Laser ring gyroscope
6. Image infrastructure
7. Improve the in-hull 35 mm cameras
8. Homer Probes
9. Pencil cameras
10. (tie) Obtain an improved CTD pump
10. (tie) Obtain a flat LCD monitor
11. Obtain a new set of push cores with core catchers

In addition to the prioritized list of upgrades, Dan raised other comments and issues regarding the Facility:

- **Power Training Session** - DESSC recommended that the operator and committee raise community awareness on the issue of power usage. This should be addressed at the pre-AGU

DESSC meeting. Development of a power training video to be viewed at the beginning of each cruise was recommended

- **VB System** - ALVIN's variable ballast system will need to be upgraded in the near future. DSOG needs to design and plan for VB replacement during this overhaul.
- **In-hull Navigation Receiver** - Replace the existing system with an off-the-shelf model.
- **Navigation** - Increase the number of transponders available to science.

Dan concluded by noting that various items have been purchased and will be incorporated during this overhaul. These include the pan and tilt camera and the new 3-chip video camera.

2. ALVIN Overhaul Plans - Barrie Walden reported on the ALVIN's overhaul, see ***Appendix IX***. The sub has been disassembled and the frame is being inspected. The hull will be inspected in October. The syntactic foam is aging and will be examined to determine if replacement is necessary. ALVIN's explosive bolts will be replaced in November. The bulk of the overhaul work involves the sub assembly. The overhaul plans include battery and battery box replacement, rewiring of the relay cans, repackaging the motor controllers, imaging and data infrastructure upgrade, installation of WINFrog navigation and the forebody camera/pan-and-tilt. The overhaul is scheduled to be complete by 31 March 1997. In April, ALVIN will be put on ATLANTIS and the sub and ship will be ready for science in early June.

Barrie compared DESSC's prioritized list of ALVIN upgrades to the current overhaul plans. (The overhaul plans were also provided in Dan Fornari's suggested approach for an equipment upgrade proposal, ***Appendix X***. The infrastructure for the datalogger upgrade will be installed, however, the upgrade will not be complete until the late 1997-1998 time frame. DSOG is looking at ways to add syntactic foam and additional power. During the overhaul, WHOI will ensure that adequate wiring to the forebody of ALVIN is installed to accommodate additional camera connections. Additionally, the in-hull wiring from the penetrators to the video recorders will be replaced. DSOG will attempt to improve the in-hull 35 mm cameras. Funding will be needed to purchase dual head scanning sonars, slurp pumps, Homer probes, pencil cameras, a CTD pump and a laser ring gyroscope. It was noted that the gyro must be a northseeker for use with ALVIN, however, for ROV operations the increased resolution of the ring laser gyro would provide much improved heading capability. DSOG has tested different LCD monitors but have not found one that they would like to purchase. They will continue their search. DSOG does not have plans to obtain a new set of push cores. The existing push cores work well in a wide variety of terrains and any specialized corers should be provided by the science program needing them. Barrie reported that DSOG will produce a power training video as part of the 1997 upgrade proposal. They will also look into ways of redesigning the VB systems so that it can be implemented in a future in a future major overhaul.

3. Status of New Proposals, etc. - Dan Fornari presented the suggested approach to the WHOI-DSOG equipment upgrade proposal, see ***Appendix X***. The approach addresses each item on the prioritized list of upgrades and recommends the type of equipment needed to satisfy the upgrade. In addition to the prioritized upgrades, Dan also addressed other items that could be included in the upgrade proposal. These include having a data overlay capability on the video. The capability would preserve the quality of the image and at the same time allow the time/date to be added to

an image. Dan also suggested that the inductively coupled link for remote temperature probes and modular data connections to ALVIN and Jason manipulators be included in the proposal. He noted that the Jason elevators have been working very well and improvements in the $5k to $10K would be extremely beneficial.

Dan concluded by explaining that the proposal has not been submitted since there are a number of unresolved issues. With the overhaul underway, some questions are being answered. The proposal will be ready for submittal by late October. It is hoped that if approved, funds could be available by the first quarter of next year, since this would allow for the incorporation of many of the prioritized upgrades during ALVIN's overhaul period.

4. Jason Overhaul/Upgrade plans - Barrie Walden reported that requirements for the 1997 cruise to DERBYSHIRE wreckage call for a complete forensic survey and sampling of the ship's metal. Some upgrading of Jason's systems will be necessary before conducting these operations and will benefit the vehicle systems and future science capabilities.

5. Third Party Tool Policy - Dan Fornari provided a revised draft of the 3rd Party Tool Policy, see ***Appendix XI***. The revisions were highlighted in bold print. There was discussion regarding the maintenance of a tool while it is in custody of the developer. Dan said he would rewrite the policy and distribute it to the agency representatives.

VI. Navy's plans for SEACLIFF/TURTLE - Sujata Millick reported that the Navy plans to retire SEACLIFF and TURTLE. SEACLIFF is scheduled to retire in FY98 and TURTLE will retire in FY97. The Navy will request DESSC to review and evaluate the requirement for deep diving manned submersibles and identify the current and future capabilities needed to fulfill those requirements. (Note: since this meeting, Navy sent a letter to DESSC requesting their input and the Chair has organized a working group to address the Navy's questions and future deep submergence needs.) DESSC will utilize the AGU meeting to poll the community on this topic.

The meeting was adjourned at 5:00 p.m.

APPENDIX I

Tentative Agenda

Deep Submergence Science Committee Meeting

National Science Foundation
Room 1235

September 18, 1996

10:00 AM (Room 1235, NSF)

I. Welcome, Introductory Remarks (M. Perfit)

II. Current Status of ATLANTIS Delivery

III. Long and Short-term Schedules for ALVIN/ROVs
(Moller, Pittenger, Fornari)

- 1996 Field Programs
- 1997-98 DSOG tentative schedule and logistics
- Global Initiatives (Perfit, Fryer)

IV. Integrated Deep Submergence Management and Operations Plan
(Pittenger and WHOI personnel)

1. Integration of ALVIN and tethered vehicle personnel
2. Plan for shorebased and shipboard operations
3. Draft Operations Scenarios for Vehicle Use on ATLANTIS and, when required, for ROV flyaway ops.

V. Synopses of Ongoing Upgrade and Overhaul Plans

1. ALVIN Overhaul plans (Walden)
2. Jason Overhaul/Upgrade plans (Walden)
{Darbyshire preparations}
3. Status of ALVIN power, Pan and Tilt, Remote Temperature Loggers, Electronic still camera, new proposals (Fornari)
4. DESSC Upgrade priorities (Perfit/Orange)
5. Third-Party Tool Update (Fornari)

VI. General Discussion of Navy plans for Sea Cliff and dialog on implications for Science

End of Meeting 5:00 PM

APPENDIX II

DESSC - September 18, 1996

NAME	AFFILIATION	TELEPHONE	FAX	EMAIL ADDRESS
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Bruce Malfait	NSF/OLP	(703) 306-1581		bmalfait@nsf.gov
Sujata Millick	ONR	(703) 696-4530	(703) 696-2007	millics@onrhq.onr.navy.mil
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Dan Orange	MBARI	(408) 775-1761	(408) 775-1645	dano@mbari.org
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Alexander Shor	NSF	(703) 306-1581	(703) 306-0390	ashor@nsf.gov
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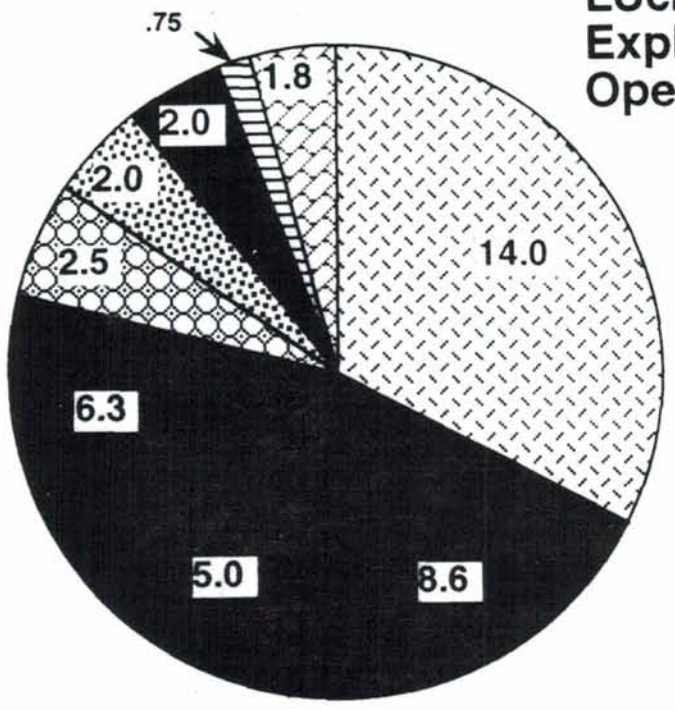
Barry Walden	WHOI	(508) 289-2407		bwalden@whoi.edu
Marsh Youngbluth	NSF/OCE	(703) 306-1587		myoungbl@nsf.gov

APPENDIX III

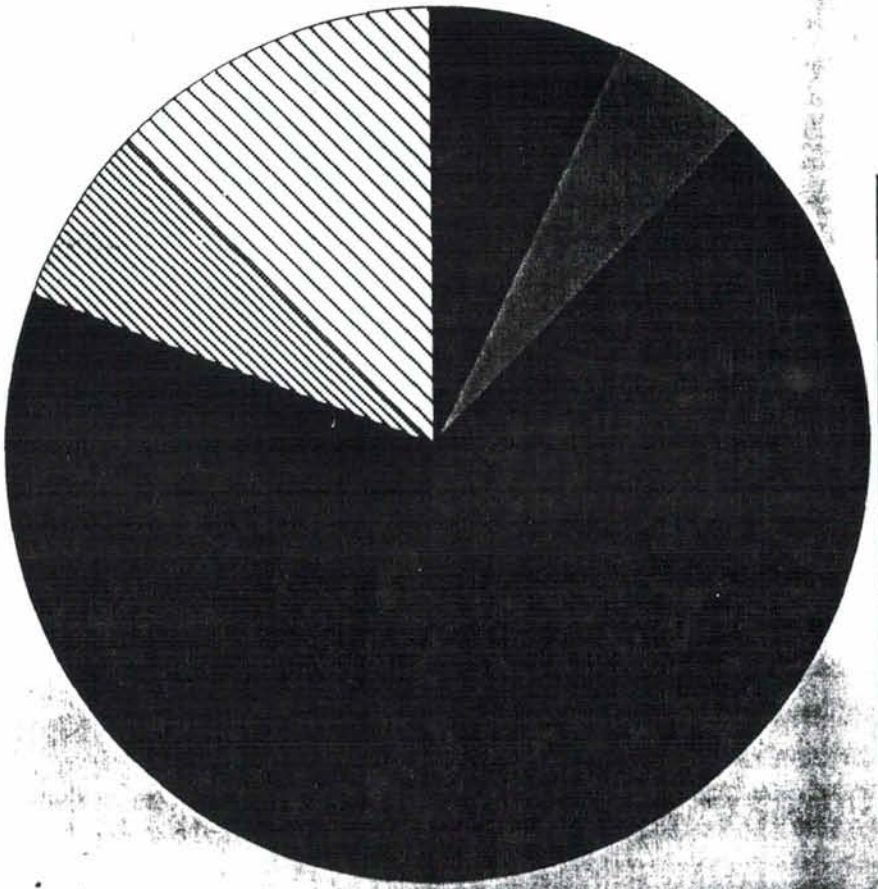
LUSTRE '96
LUcky STRike
Exploration 1996
Operational Summary



Time (days)

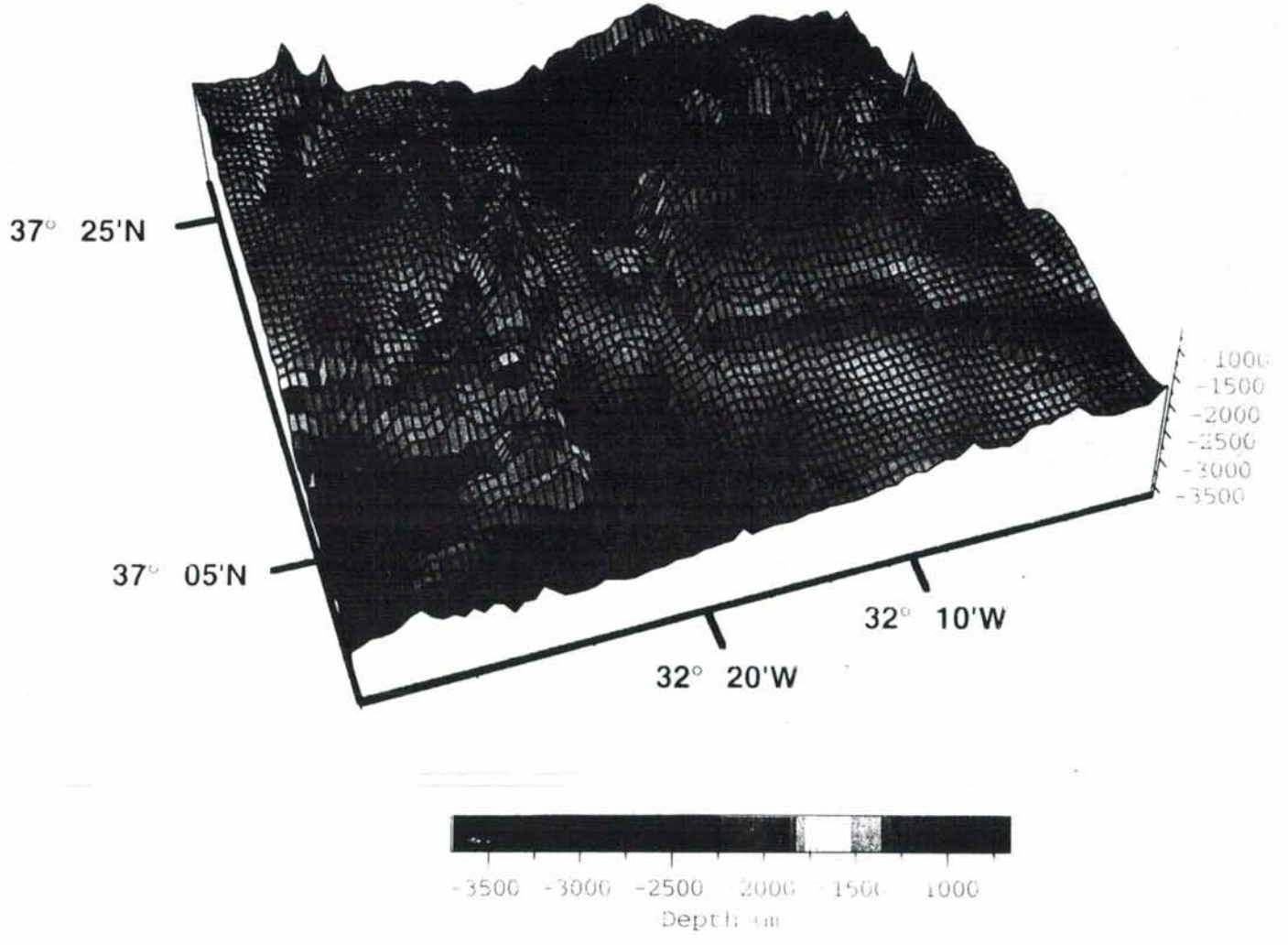
- Port-to-Port Transits
- 120 Sonar
- ARGO-II
- Jason
- Transponders
- Dredging/Rock Coring
- Vehicle Repairs
- Science Transits
- Vehicle Transfers

Summary of Science and Vehicle Operations
For All Jason Lowerings LUSTRE '96
Lucky Strike - 1996 R/V Knorr 145-19



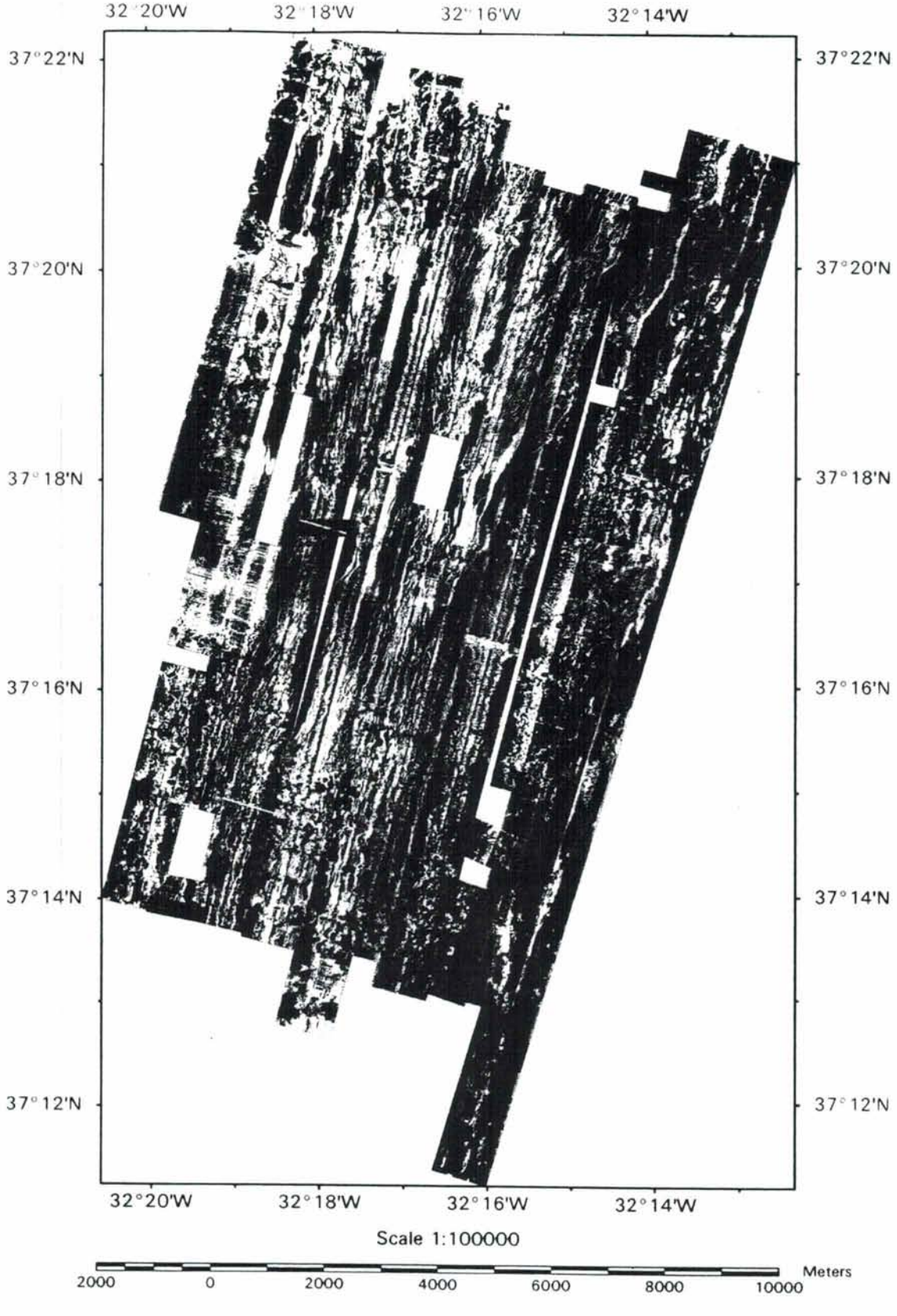
Total On-Bottom Time: 89hr 31min

- Water Sampling
- [illegible]
- Shrimp Slurping
- Sediment Push Coring
- Sulfide/Basalt Sampling
- Imaging/Exploration
- Troubleshooting
- Transits to Elevator
- Equipment Transfers at Elevator


37° 25'N
37° 05'N
32° 10'W
32° 20'W
-1000
-1500
-2000
-2500
-3000
-3500
-3500 -3000 -2500 -2000 -1500 -1000
Depth (m)

LUSTRE '96

DSL120 Northern Survey - Along Axis



Scale 1:100000

2000 0 2000 4000 6000 8000 10000 Meters

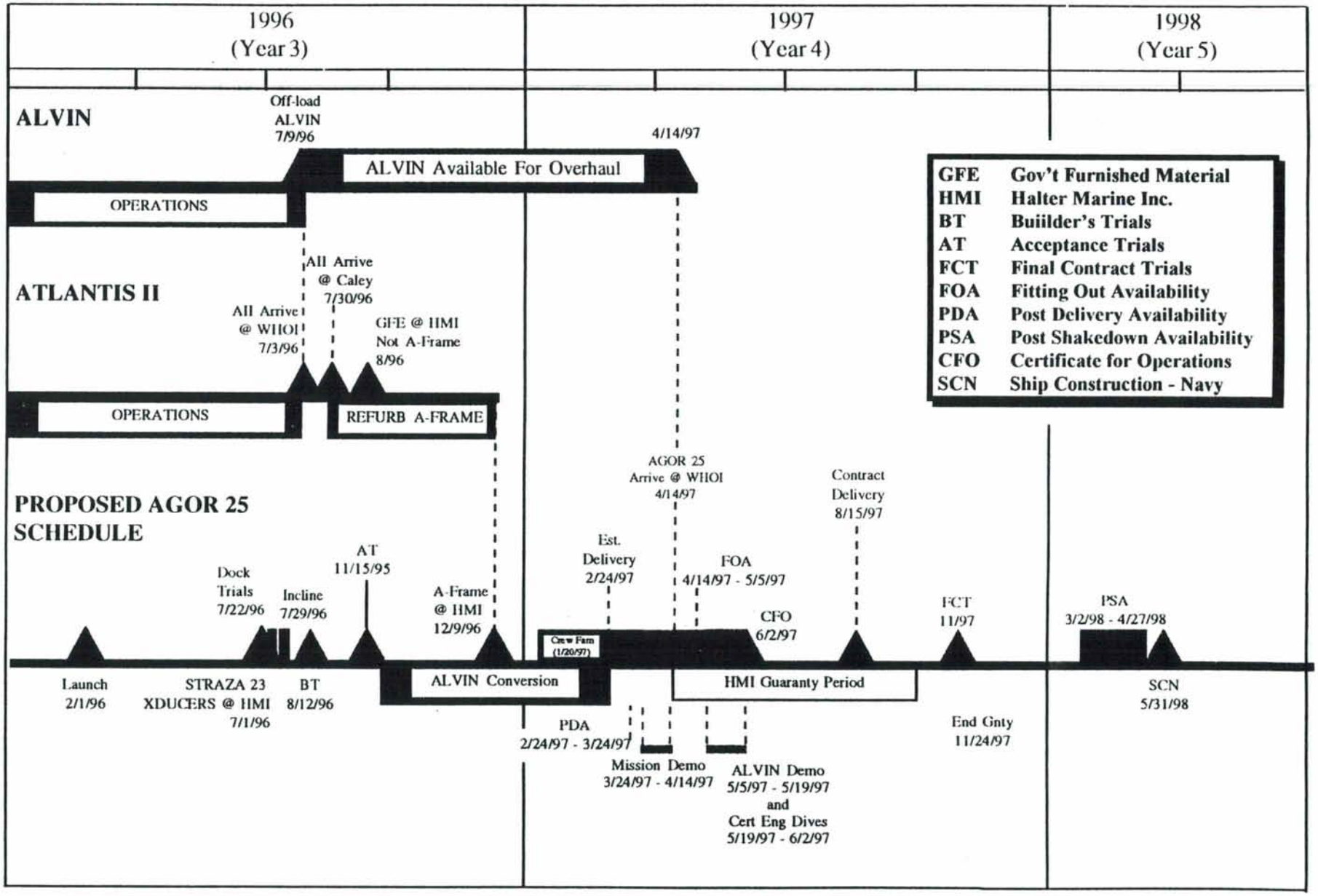
APPENDIX IV

Current Status
and
Post-Delivery Events

16 Jul 96

AGOR 25/ATLANTIS II/ALVIN Schedule

(Estimated Delivery - 24 Feb 97)



▲ - MILESTONES ▲ - TESTS & TRIALS/OPERATIONS ▬ - YARD PERIODS

APPENDIX V

1997

Funded Alvin Dive Requests

Area	P.I.	# dives	Comments
Atlantic, NA6	D.Calder/Ont.	2	Bermuda
NA7	Chave/WHOI	6	TAG (w/vanDover)
NA7	Vrijenhoek/RUTG	14	MAR, 37N to 15N
NA7	BRIDGE/UK	5	Lucky Strike
		27	

Area	P.I.	# dives	Comments
No. EPR,10N	Taylor,Wirsen/WHOI	5	NSF/IBN
2N(Hess Deep)	J. Karson/Duke	15	w/Jason
		20	

Area	P.I.	# dives	Comments
Juan de Fuca Region	Chave/WHOI	6	w/VanDover
		6	

Area	P.I.	# dives	Comments
California Coast	C.Smith/Haw	3	3rd of 3 cruises
		3	

Area	P.I.	# dives	Comments
So. EPR, 17-22S	Vrijenhoek/Rutgers	14	Gene flow
"	Chave/WHOI	6	w/VanDover
"	M. Lilley/UW	27	w/vonDamm,Lupton
"	J.Sinton/Haw	27	w/AMS-120
"	J.Childress/UCSB	6	
		80	

Total dives on books 136

DAM -9/12/96

1997

Funded ROV/ARGO/AMS-120 Requests

Area	P.I.	# sci.days	Comments
Atlantic		0	

Area	P.I.	# sci.days	Comments
No. EPR, 10N	R.Lutz/Rutgers	23	Jason
2N(Hess Deep)	J. Karson/Duke	15	Jason,w/Alvin
		38	

Area	P.I.	# sci.days	Comments
Juan de Fuca Region	K.Becker/Miami	6	Jason
"	W.Chadwick/OSU	5	Jason
"	JP.Johnson/UW	4	Jason
"	R.Embly/PMEL	10	Jason (PENDING)
		25	

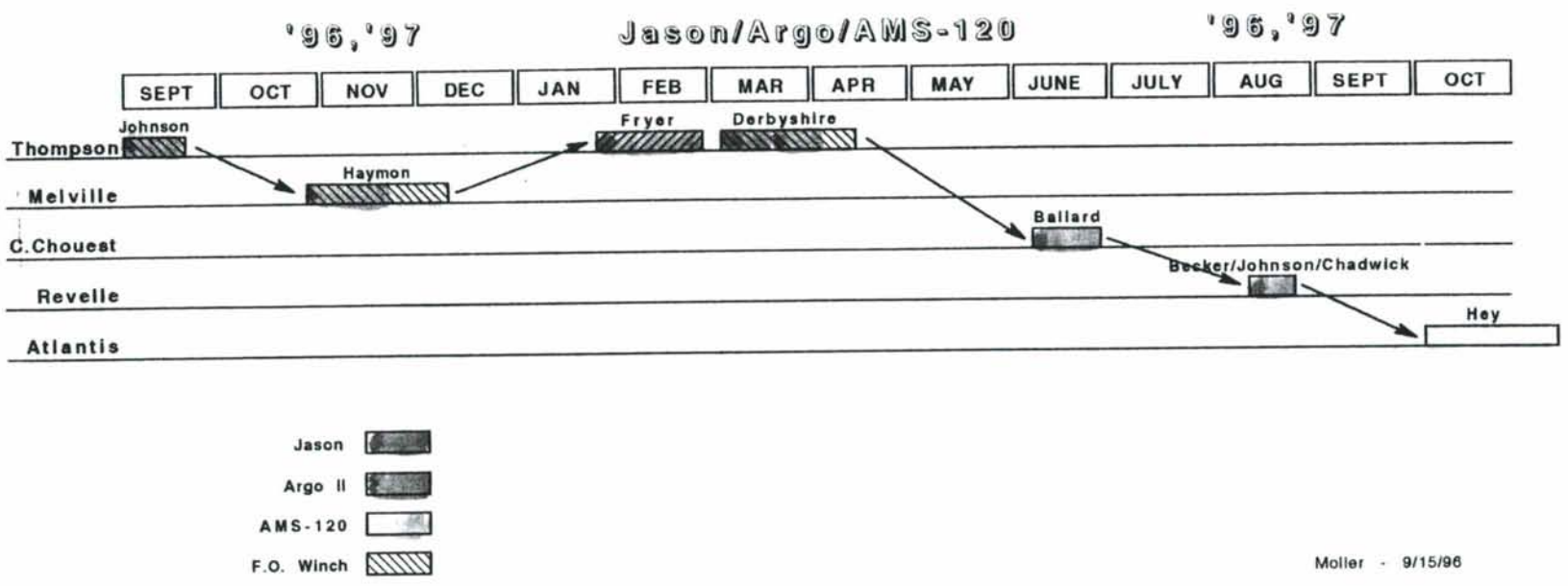
Area	P.I.	# sci.days	Comments
So. EPR, 28-32S	R. Hey/Haw	30	AMS-120
17-18S	J.Sinton/Haw	3	AMS-120, w Alvin
		33	

Area	P.I.	# ops.days	Comments
West. North Pacific	Derbyshire/UK	35	ARGO, Jason, AMS-120
Mariana ForeArc	P.Fryer/Haw	27	Jason
		62	

Area	P.I.	# sci.days	Comments
Mediterranean	R. Ballard/WHOI	22	Jason
		22	

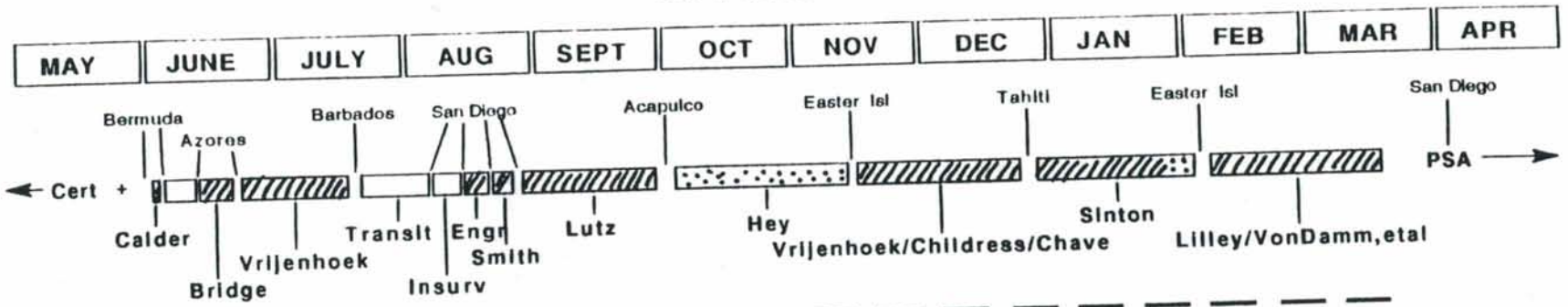
Total days on sta. on books 180

DAM -9/12/96

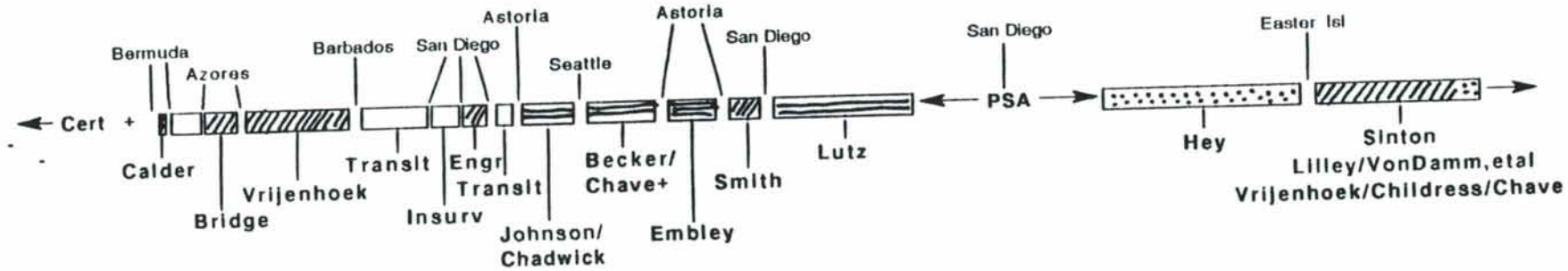

'96,'97
Jason/Argo/AMS-120
'96,'97
SEPT
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUNE
JULY
AUG
SEPT
OCT
Thompson
Melville
C.Chouest
Revelle
Atlantis
Johnson
Haymon
Fryer
Derbyshire
Ballard
Becker/Johnson/Chadwick
Hey
Jason
Argo II
AMS-120
F.O. Winch
Moller - 9/15/96

1997 ATLANTIS 1997 (Dated: 15 Sept.'96)

- OPTION A -

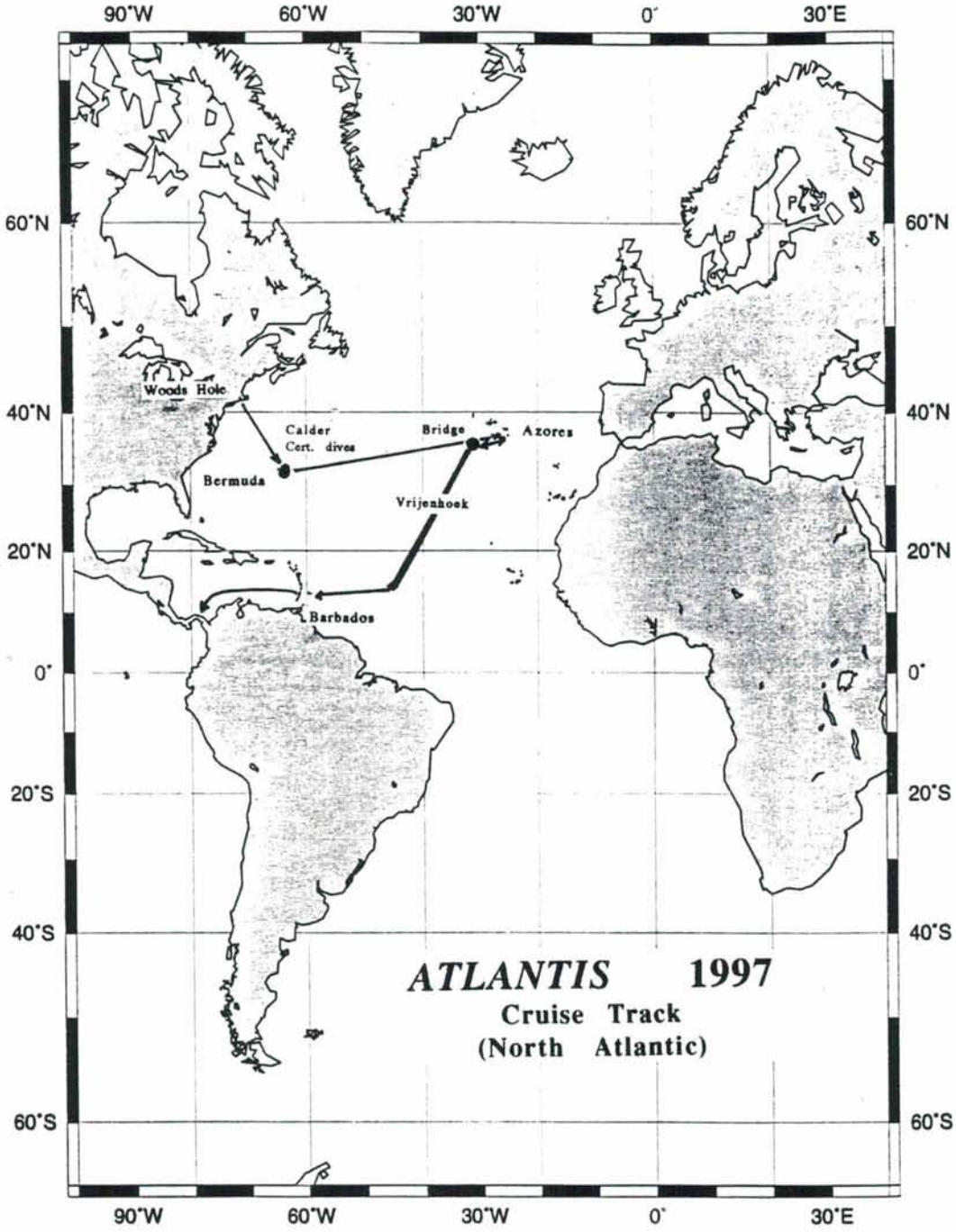


- OPTION B -



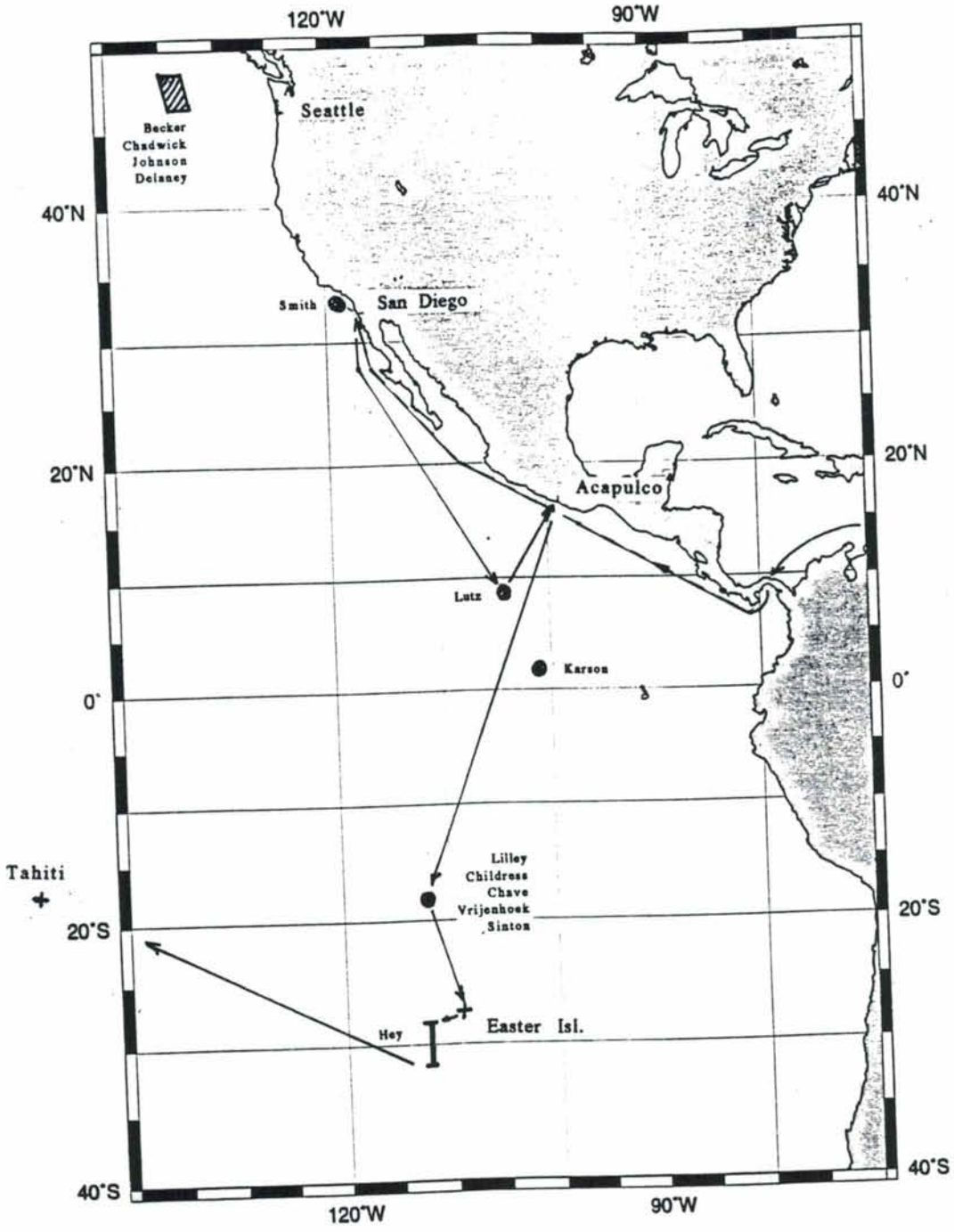
Jason
Argo II
AMS-120
Alvin

D.Moller - 9/15/96



MOC04: Atlantic Ocean

WHOI / Moller



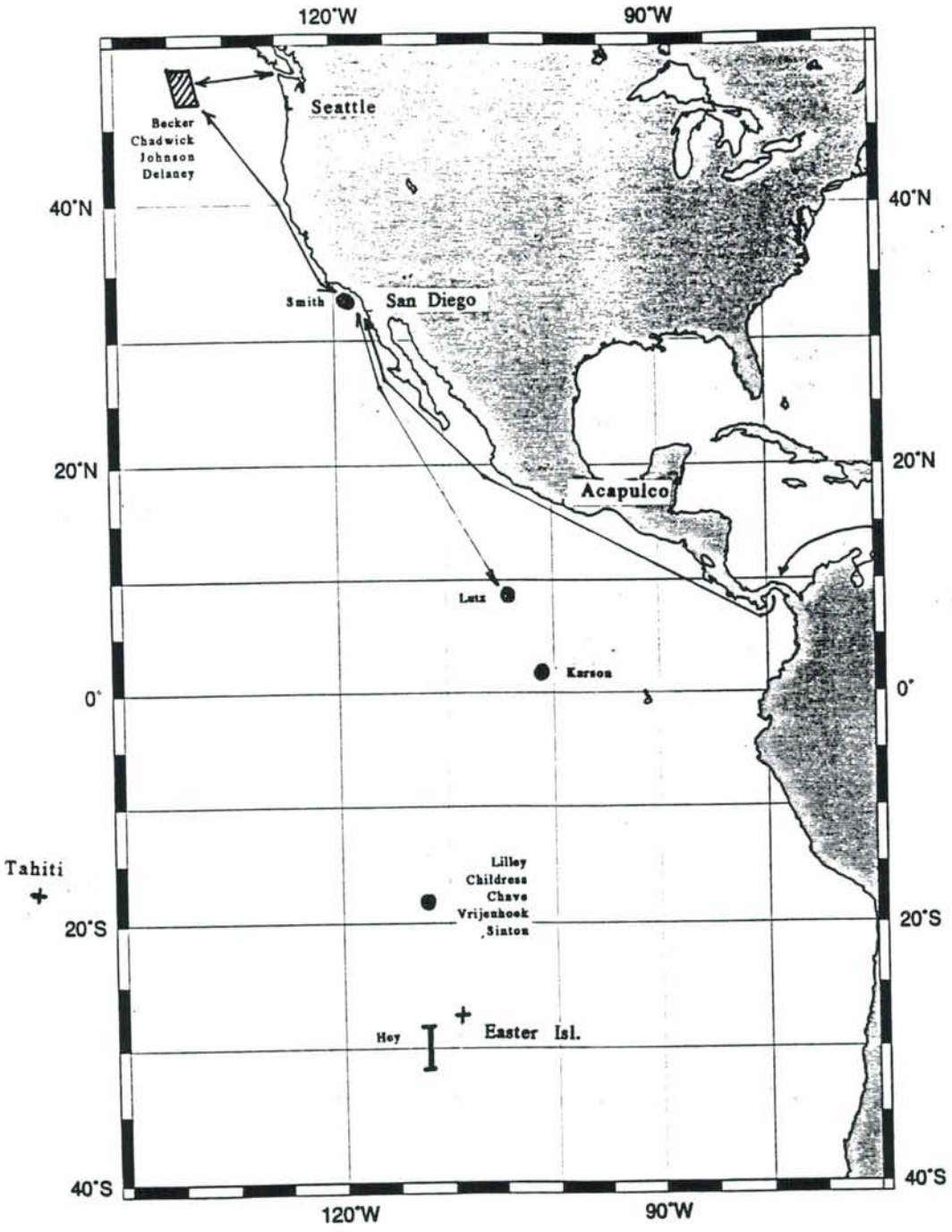
***ATLANTIS* 1997**

Cruise Track

MOC11: Equatorial Pacific Ocean

WHOI / Moll

OPTION A



ATLANTIS 1997

Cruise Track

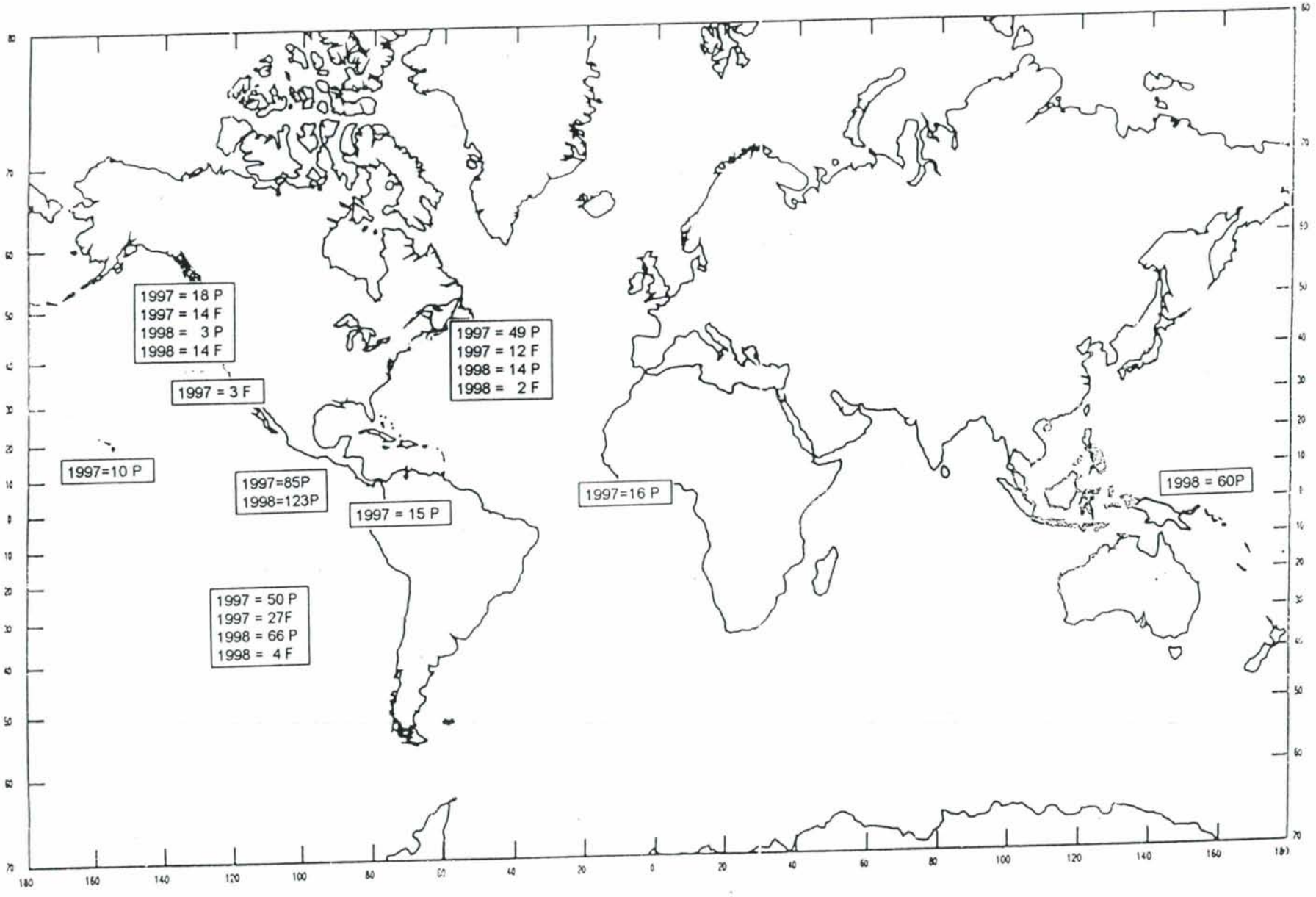
WHOI / Moll

MOC11: Equatorial Pacific Ocean

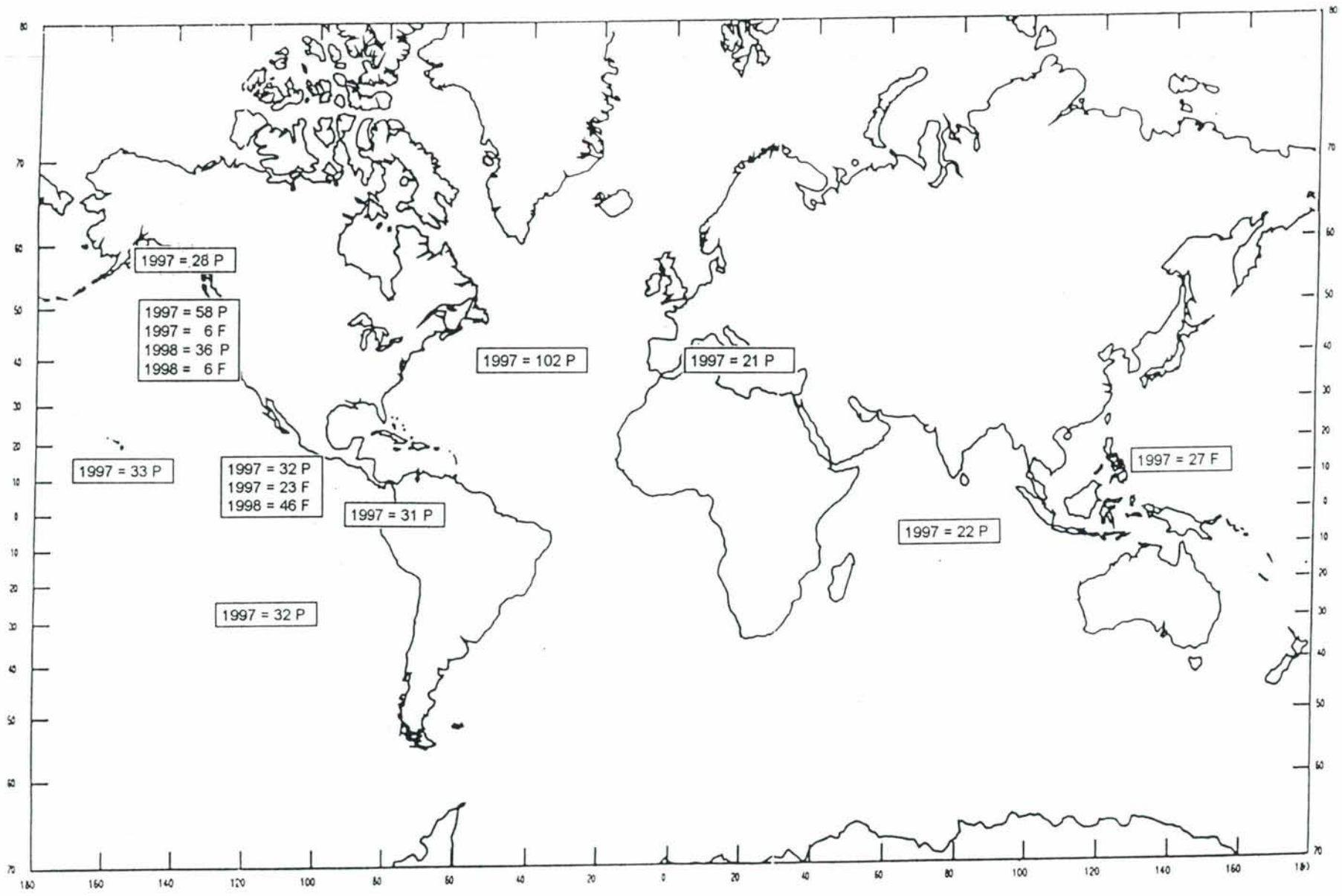
OPTION B

APPENDIX VI

ALVIN AREAS OF INTEREST - 1997 AND BEYOND



ROV AREAS OF INTEREST - 1997 AND BEYOND



APPENDIX VII

From rpittenger@cliff.whoi.edu Wed Sep 18 07:43:07 1996
From: rpittenger@cliff.whoi.edu
Date: Tue, 17 Sep 96 11:31:56 est
To: unols@gsosun1.gso.uri.edu
Subject: Nat'l Deep Submergence Facility Concept of Int. Fac. Ops.

TO: DESSC
E. Dieter
S. Millick
G. Smith

FROM: R. Pittenger

SUBJ: National Deep Submergence Facility Concept
of Integrated Facility Operations

Forwarded herewith is the Executive Summary of our draft concept of ops.

* *

Richard Pittenger
17 September 1996

Woods Hole Oceanographic Institution

National Deep Submergence Facility

Deep Submergence Operations Group
Concept of Integrated Facility Operations

Executive Summary

Woods Hole Oceanographic Institution (WHOI) has operated the U.S. National Facility for Deep Submergence for the past 33 years. The seagoing support ship, and the deep submergence vehicles that are launched and recovered from it, which WHOI operates for the academic community, represent the principal modes of access for U.S. scientists to study the deep ocean and sea floor in situ. The work that WHOI and the oceanographic community have done with these facilities has revolutionized our understanding of earth and ocean processes. Research that is conducted with the submersible Alvin, the remotely operated vehicle (ROV) Jason, and the other towed and autonomous vehicles that WHOI operates for scientists, is essential to the investigation of many fundamental oceanographic and earth science problems that will impact society well into the 21st century. Problems as diverse as: the temperature and chemical structure of the world's oceans, tectonics of the mid-ocean ridge system, understanding the crustal structure and physical processes at continental margins, transfer of heat and chemicals from the Earth's mantle to the biosphere, and the ecology and genetic history of deep ocean hydrothermal vent fauna, all require the capability to access the deep ocean and sea bed via deep submergence vehicles.

The U.S. Federal funding agencies which have a mandate to support oceanographic science (the National Science Foundation, the U.S. Navy Office of Naval Research, and the National Oceanic and

Atmospheric Administration), have, over the past few years, furthered their commitment to exploration and study of the deep ocean by making possible the conversion of the R/V Atlantis to serve as the new support ship for the National Deep Submergence Facility vehicles: Alvin, ROV Jason, Argo-II and the DSL-120 sonar. Starting in Summer, 1997, the R/V Atlantis and the National Facility vehicles will be operated from Atlantis, which will usher in an era of integrated deep submergence vehicle operations that have enormous potential to facilitate and enhance scientific research in the deep ocean and on the sea bed to depths of 6,000 m.

Given the challenge of operating the integrated National Facility vehicles in this new paradigm afforded by R/V Atlantis, WHOI has developed a draft plan for the concept of operations of the National Facility vehicles and support ship. The following brief description and attached tables and charts will serve to introduce this concept of operations to the Deep Submergence Science Committee (DESSC) and the Federal funding agency representatives. It is hoped that this draft concept of operations will provide DESSC members and funding agency representatives with sufficient information so that operational procedures, staffing requirements, and budgetary information can be placed in their proper, facility-wide context.

Summary information is provided on the R/V Atlantis, and the various vehicle systems. Additional information for the ship, vehicles and WHOI is available on-line in the new WHOI Marine Operations and Deep Submergence Operations Group (DSOG) website (http://www.marine.whoi.edu/marops) which has undergone major revisions and is now nearly complete. This will be complemented by updated science user information and manuals (to be posted on the web site) and instructional video tapes which are under development. Specific personnel responsibilities and wiring diagrams between various levels of WHOI Marine Operations and DSOG and related WHOI technical support groups have been updated, as have the procedures by which scientists interact and communicate with the WHOI system. These changes have been conceived after discussion with scientists in the community and DESSC in an effort to improve and streamline the manner in which WHOI provides deep submergence science services. We see this as a necessary component of the new, integrated facility given the potential use of multiple vehicle systems during a science cruise and the requirement to stage and operate the appropriate vehicle assets, personnel, and supporting material/expendables in different configurations over the course of an operating year.

Key issues in terms of long-range planning and facility management and support for WHOI and the Federal supporting agencies are related to the logistics of vehicle operations on R/V Atlantis or on other suitable UNOLS vessels when the ROV/tethered systems are required to be operated

separate from joint field programs with Alvin/Atlantis. WHOI envisions that specific protocols be adopted to allow for various operating models to be implemented, without affecting the short-term operational capability of the facility, and ensuring the long-term, continued upgrade and maintenance of the National Deep Submergence Facility.

Operation of the integrated facility on the new R/V Atlantis will require sufficient shake-down of all the ship and vehicle systems prior to conducting funded science programs; this has been planned and budgeted for in our draft 1997 operations timetable. After consultation with DESSC and the funding agencies, we have proposed two deep submergence operational schedules for 1997-1998. Our objectives in providing these schedules are to accommodate as much funded science as possible given weather and logistical constraints on the vehicle systems, and to facilitate the integration of joint Alvin and ROV Jason/tethered vehicle operations on R/V Atlantis as rapidly as possible.

WHOI is committed to providing excellence in deep submergence vehicle support services to the research community as it has done over the past few decades. It is poised to meet the challenges of operating the World's premier, integrated deep submergence facility for science in an efficient and cost-effective manner. We welcome comments and criticisms of our draft Concept of Operations.

Woods Hole Oceanographic Institution

National Deep Submergence Facility

Concept of Operations
(Proposed)

by

Richard F. Pittenger
Associate Director for Marine Operations

18 September 1996

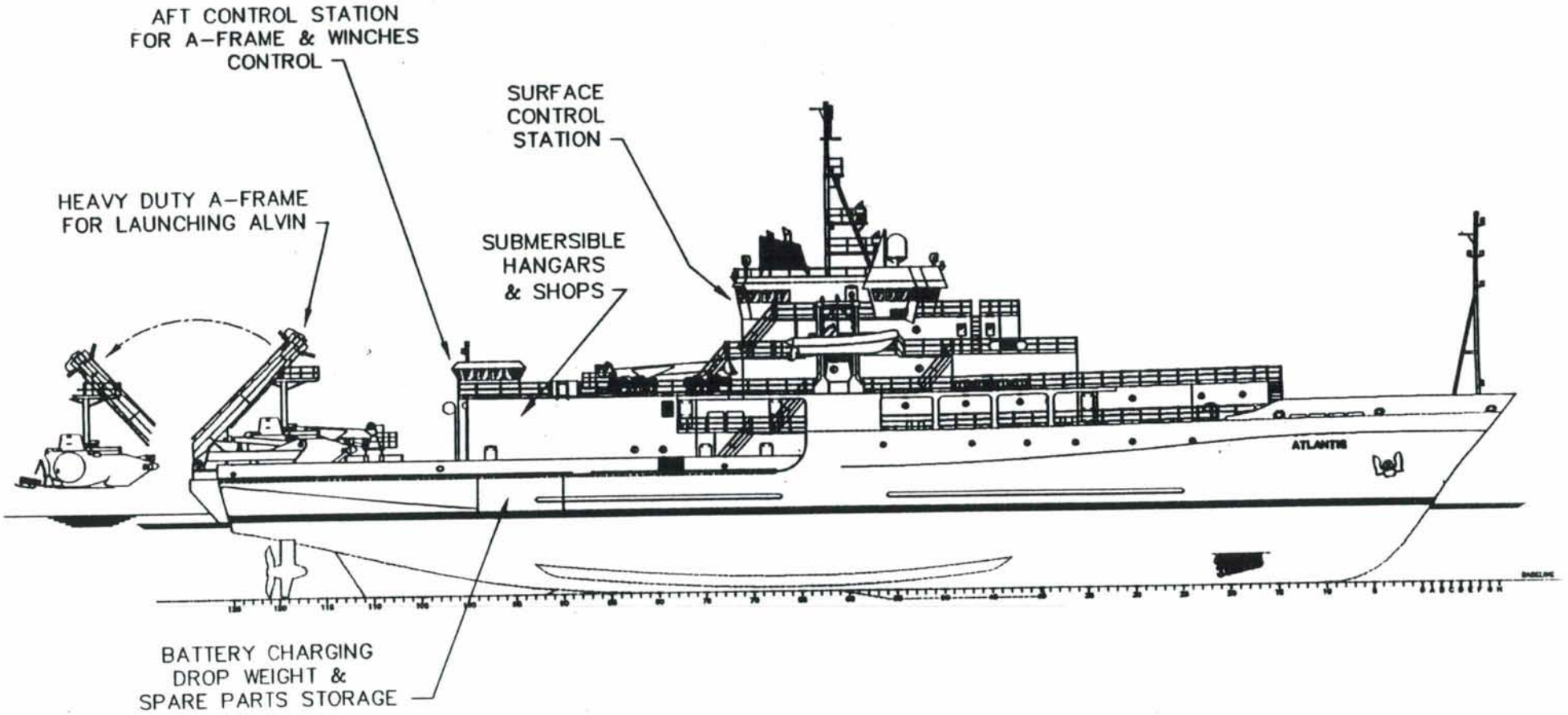
Overview

- The Facility
- Organization
- Operating Modes
- Operational/Management Issues, Policy
- Current Status
- Schedules

The Facility

- *R/V Atlantis*
- *DSV Alvin*
- *Argo/Medea/Jason/DSL-120*
- *ABE*

Outboard Profile of *R/V Atlantis* with Deep Submergence Modifications Highlighted



ATLANTIS OUTBOARD PROFILE STARBOARD

Plan View of *Atlantis* Main Deck

New Features:

***Alvin* A-Frame and Tracks**

- **A-Frame will be taken from *Atlantis II*, completely refurbished and new, more powerful hydraulic system.**
- **Positive control traversing and track system to move *Alvin* into and out of hangar.**

***Alvin* Hangar**

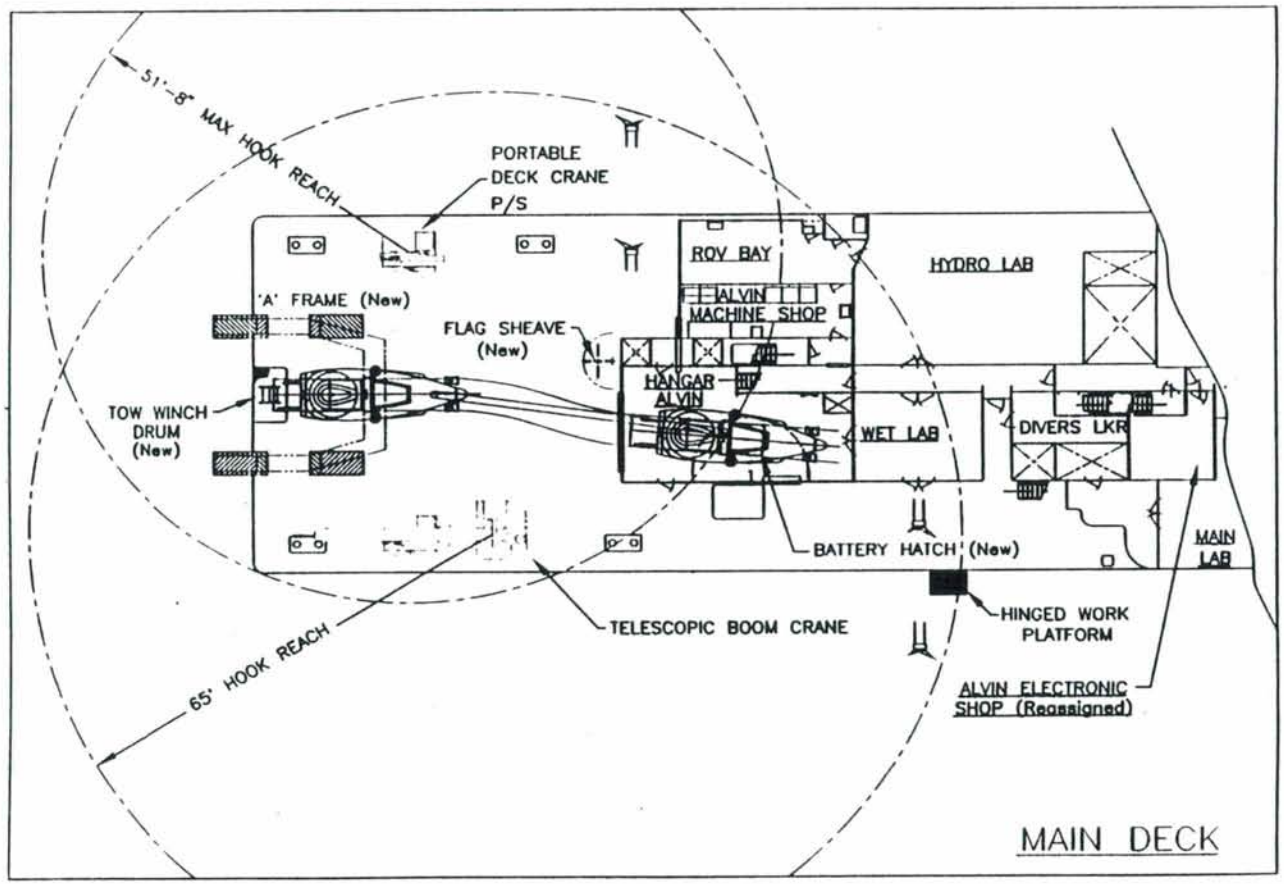
- **To provide secure, covered storage and easy access for maintenance.**

Shops (Mechanical, Electric, and Electronics)

- **Near hangar for efficiency.**

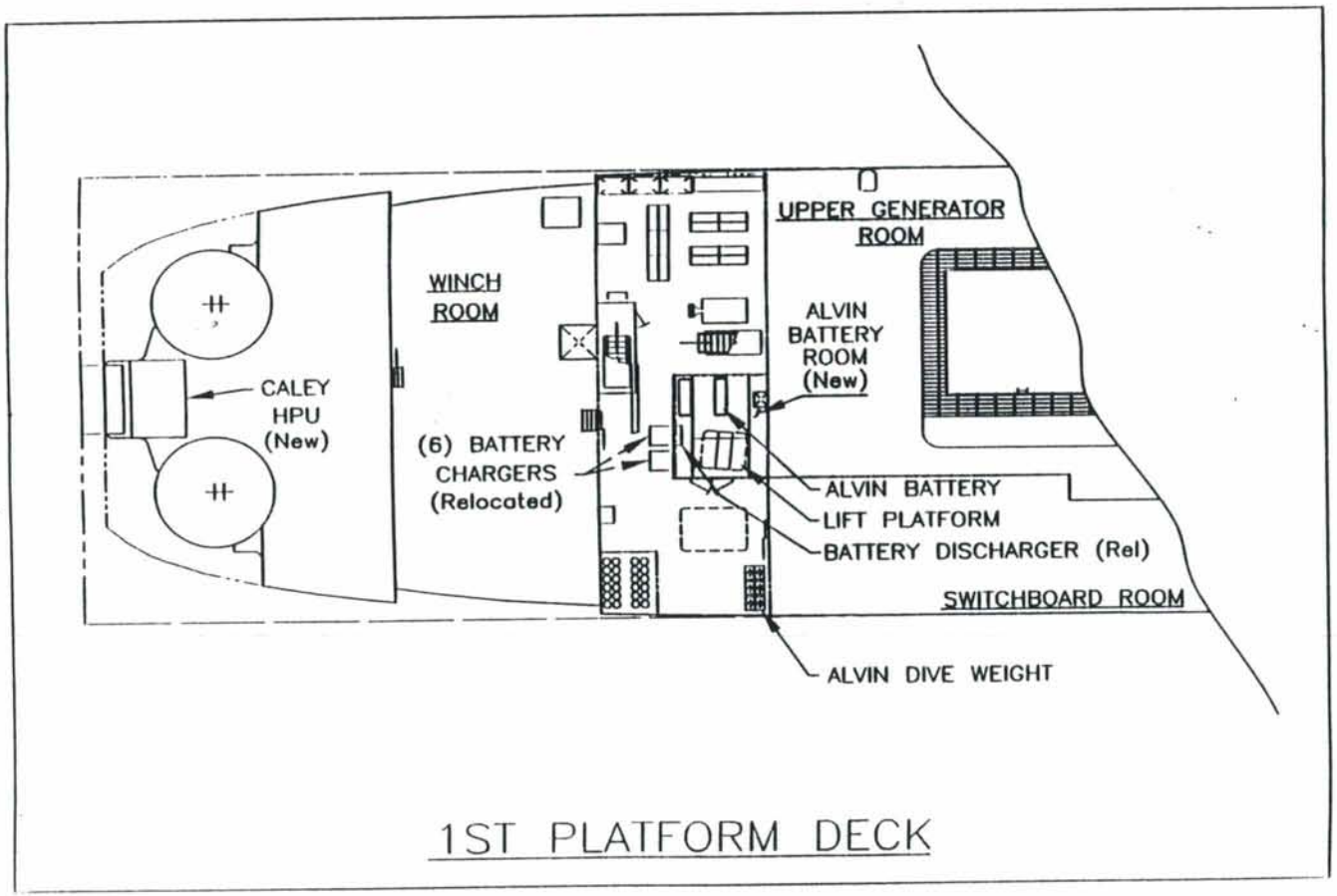
ROV Bay

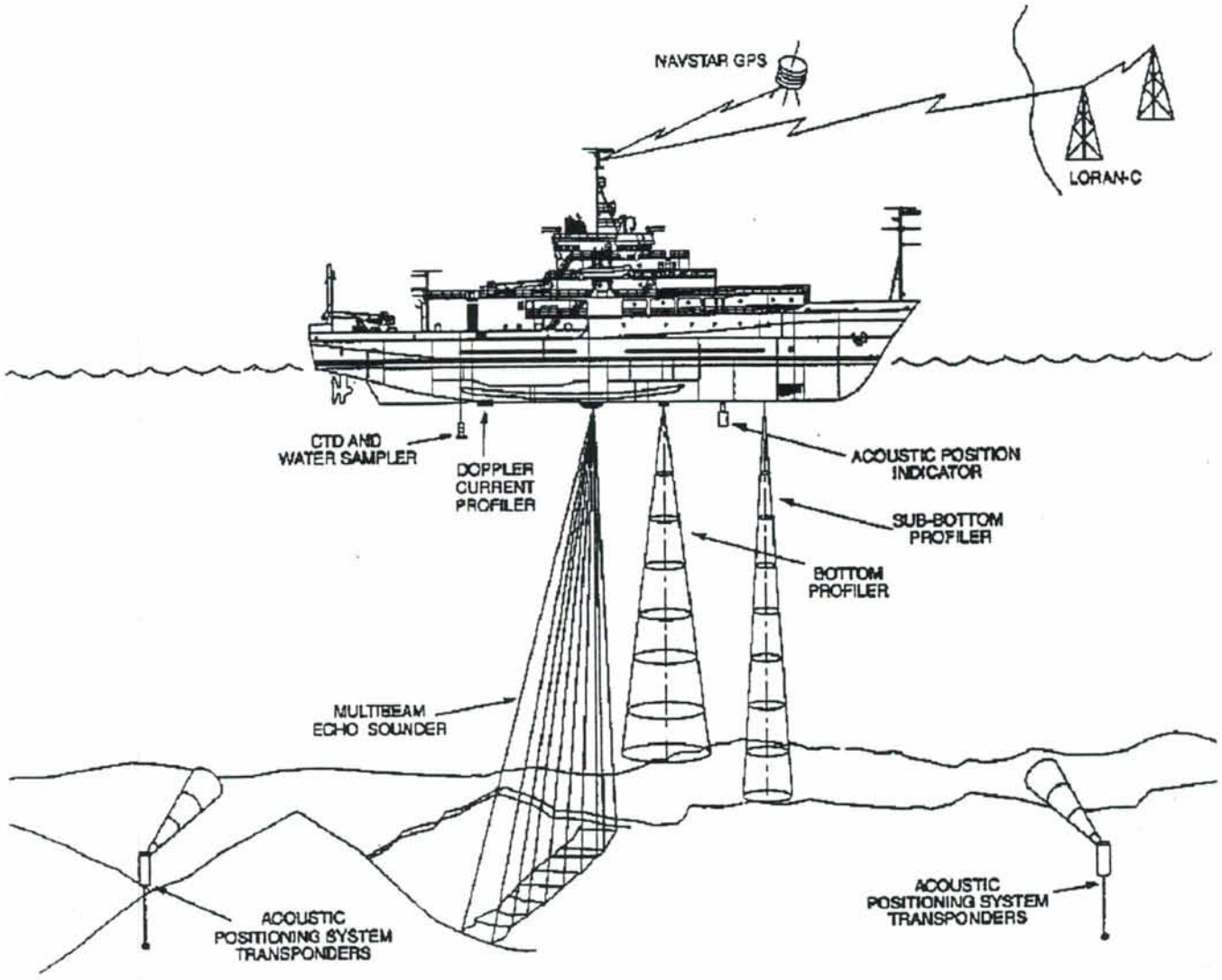
- **For Storage and maintenance of WHOI ROV's.**



Alvin Dive Weight, Battery Charging and Spare Part Storage

- **Co-located conveniently immediately below *Alvin* hangar.**
- **Battery service facility includes charger, storage for replacement battery and hydraulic lift for removing/installing heavy battery units.**
- ***Alvin* uses 1,000 lbs. of steel as descent weights on each dive. Typically the ship will carry 75,000 lbs. of expendable weights.**
- **Having an adjacent dedicated large spare parts storage for submersibles will greatly enhance the at-sea groups' efficiency.**




NAVSTAR GPS
LORAN-C
CTD AND
WATER SAMPLER
DOPPLER
CURRENT
PROFILER
ACOUSTIC POSITION
INDICATOR
SUB-BOTTOM
PROFILER
BOTTOM
PROFILER
MULTIBEAM
ECHO SOUNDER
ACOUSTIC
POSITIONING SYSTEM
TRANSPONDERS
ACOUSTIC
POSITIONING SYSTEM
TRANSPONDERS

Installed Equipment in *Atlantis*

P-Code GPS

Doppler Speed Log

Dynamic Positioning System

Acoustic Positioning / Navetronix

Swath Bathymetry System / SeaBeam 2112

Bottom Profilers / 12 kHz, 3.5 kHz

ADCP / Narrow Band 150 kHz

2 Air Compressor / Price A-300

IMET / Sea Surface Sensors

Attitude Sensors (Heading, Roll, Pitch, Yaw)/ASHTEC + Hippy

Winches

- **Two Markey DESH-5**
  10,000 m .322EM or 1/4" Hydro-wire
- **One Traction with Dual Storage Reels**
  - **Fiber Optic (.68")**
  - **EM**
  - **9/16" Trawl wire**

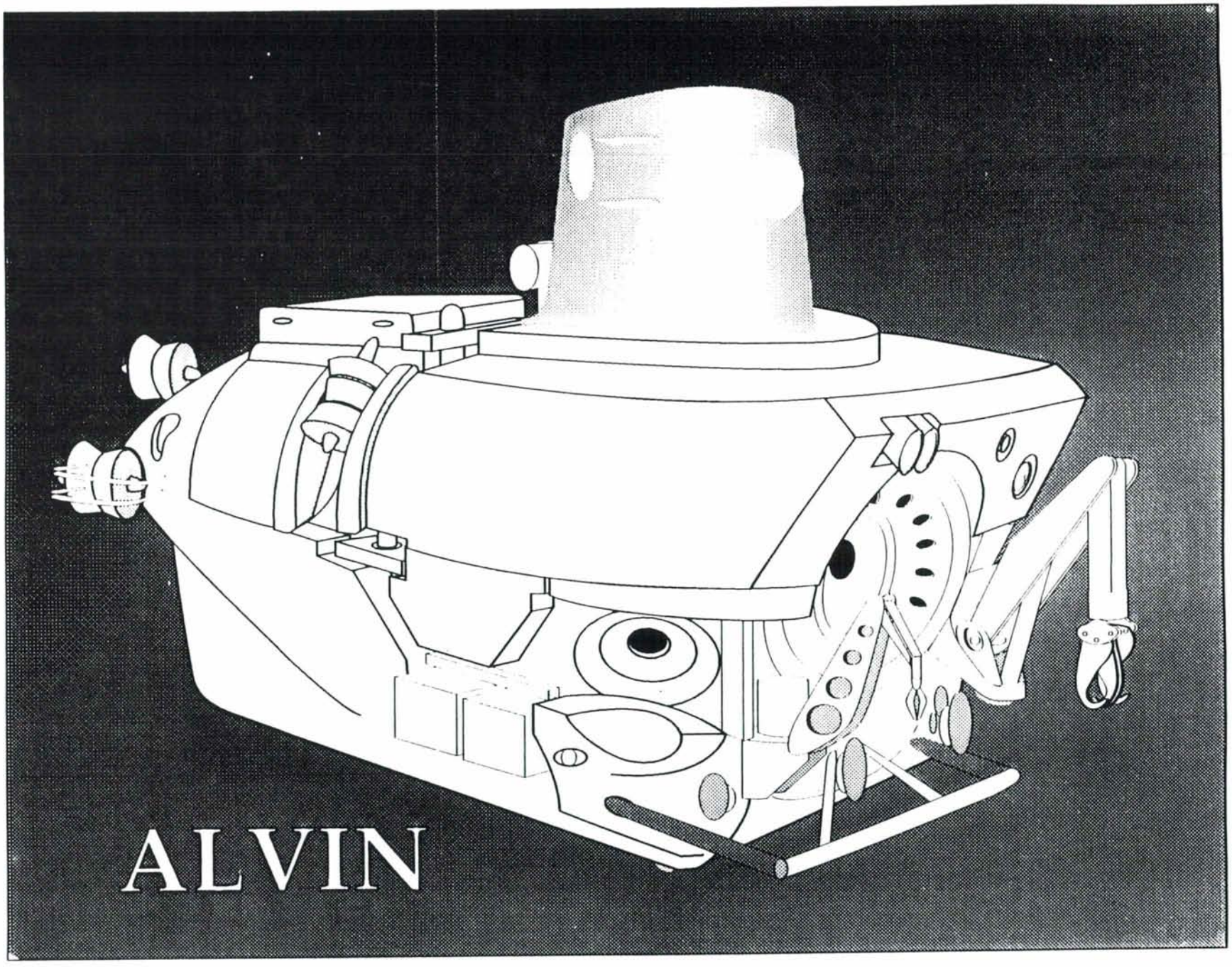
Cranes

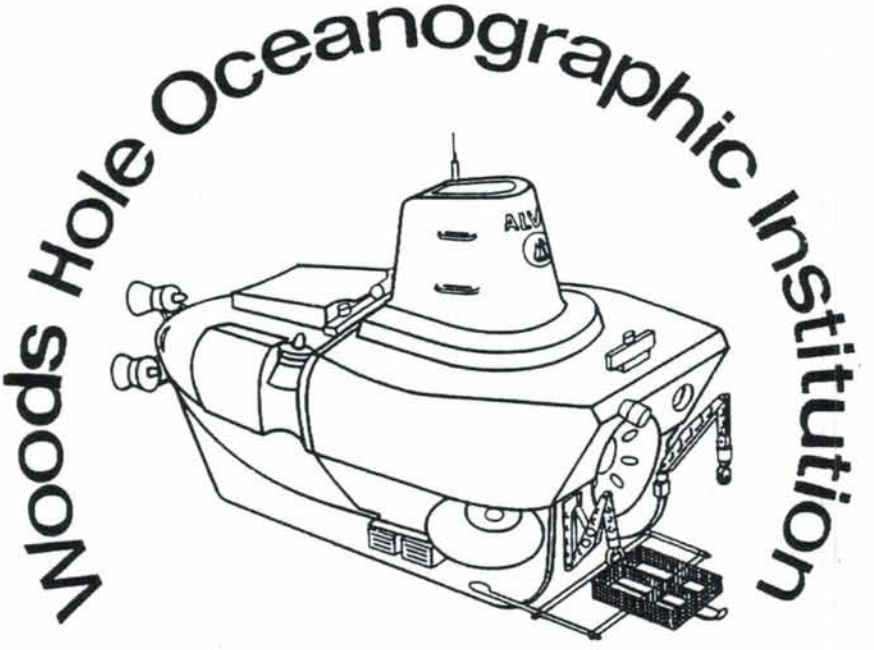
- **2 Telescopic Cranes**
  42,000 lb. lift capacity
- **2 Portable "Hiabs"**
  2,200 lb. lift capacity

Van Spots - 6 above main deck

Lab Space - 4,000 square feet

Science Berths - 24


ALVIN

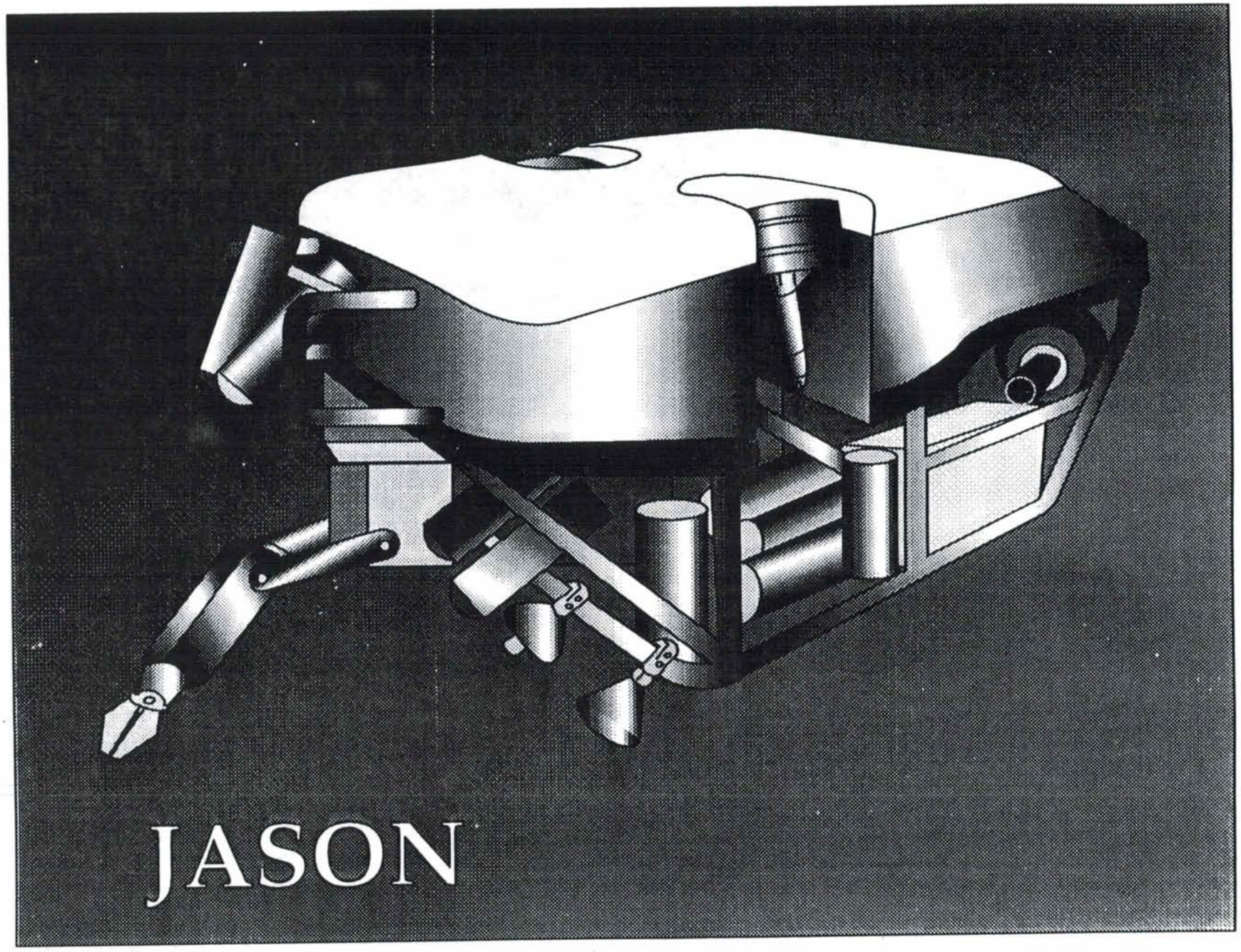


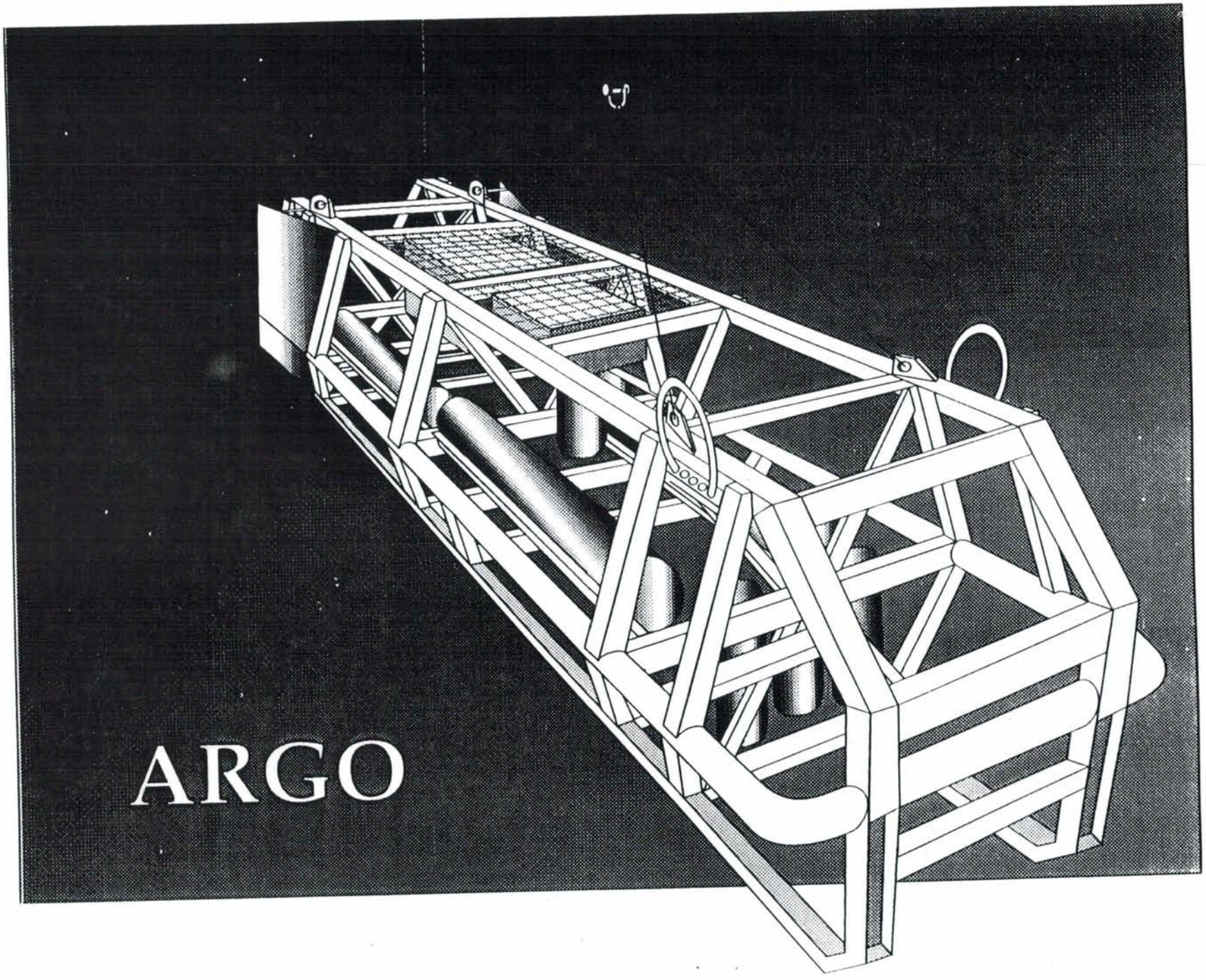
ALVIN

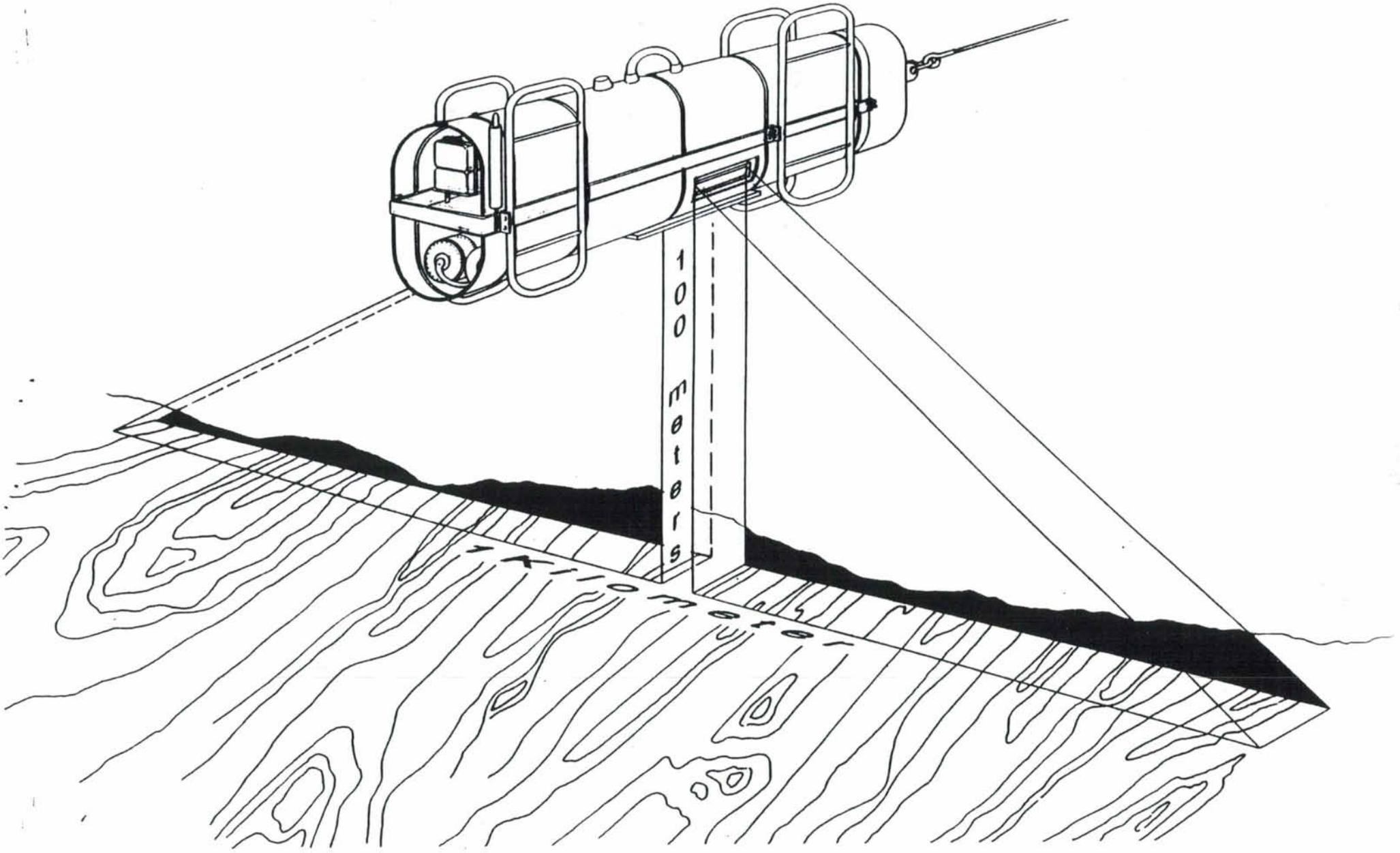
- **Human presence at the ocean floor.**
- **8-10 hour dives**
- **Safe, reliable, versatile platform for a wide variety of benthic sampling, mapping and instrument installation strategies.**

Alvin Science Equipment

- Two hydraulic manipulator arms, each with at least 100 lb. lift capacity.
- Sample basket.
- External cameras
  - ◊ Stereo 35mm film
  - ◊ 1- and 3-chip video
  - ◊ Benthos 5010 digital camera
  - ◊ Color and SIT video
  - ◊ HMI, TI and QI lighting
- Internal cameras
  - ◊ Hi-8 video camcorder
  - ◊ Hand-held 35mm SLRs
- Data display and logging system
- Sonars
  - ◊ Mesotech scanning altimeter
  - ◊ CTFM
- Science hydraulic manifold
- External electrical feeds/hook-ups
- Samplers:
  - ◊ Water
  - ◊ Sediment
  - ◊ Water temperature
  - ◊ Biota
- Sensors:
  - ◊ Heat flow probe


JASON


ARGO


100 meters
Kilometer

ROV *Jason* and Tethered Vehicles

- *Jason/Medea*
  - ◊ Detailed local-area surveys, and precise multisensory imaging, mapping, and sampling to 6,000 meters using fiber-optic telemetry.

- *Argo-II*
  - ◊ Large-area, towed fiber-optic acoustical and optical imaging and mapping system.

- DSL-120 kHz Towed Sonar
  - ◊ Split-beam towed sonar system designed for near-bottom acoustic imaging and phase-bathymetric mapping with ~1 km swath width and ~1-2 m vertical and horizontal resolution.

ROV and Tethered Vehicle Science Equipment/Sensors

Jason

- Video, still, electronic cameras and lighting
- Attitude, heading, altitude, depth, acceleration
- Navigation
- CTD
- Electric manipulator
- 200 kHz sonar
- Seven thrusters
- HMI and QI lighting
- Hydraulic power pack

Medea

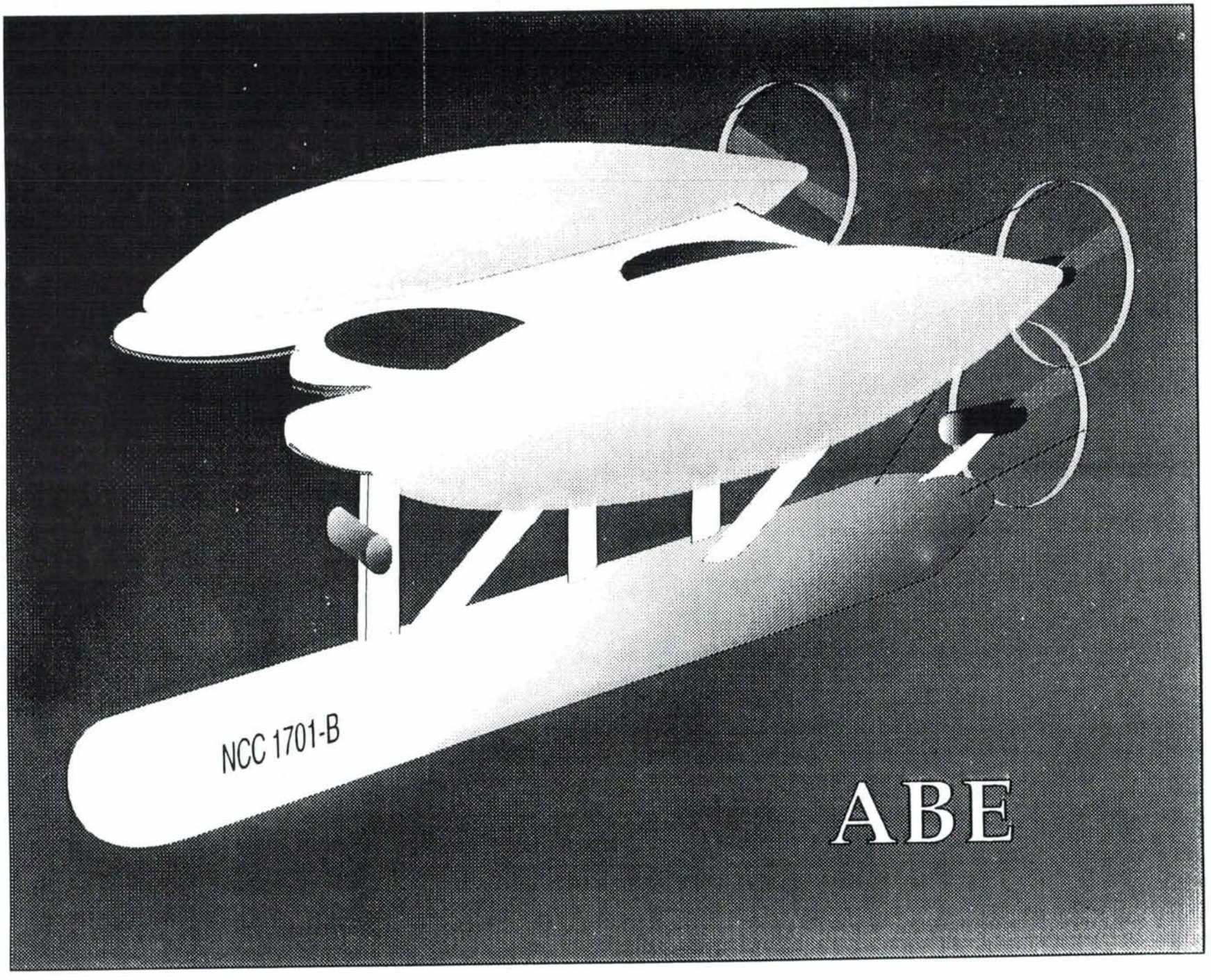
- Video and still cameras, lighting
- Attitude/navigation

Argo-II

- Video, still, electronic cameras and lighting
- Attitude/navigation
- 100 kHz obstacle avoidance sonar
- 200 kHz split-beam sonar yielding acoustic backscatter and phase bathymetric sonar swaths of ~300 m
- Imagenix scanning/altimetric sonar
- CTD
- HMI and QI lighting and 1200 w/s strobes
- Heading control thrusters (2)

DSL-120 Sonar

- 120 kHz split beam sonar
- Attitude, heading, depth
- Variable range scales
- CTD
- Magnetometer


NCC 1701-B
ABE

W.H.O.I. - OSS
(Operational Scientific Services)

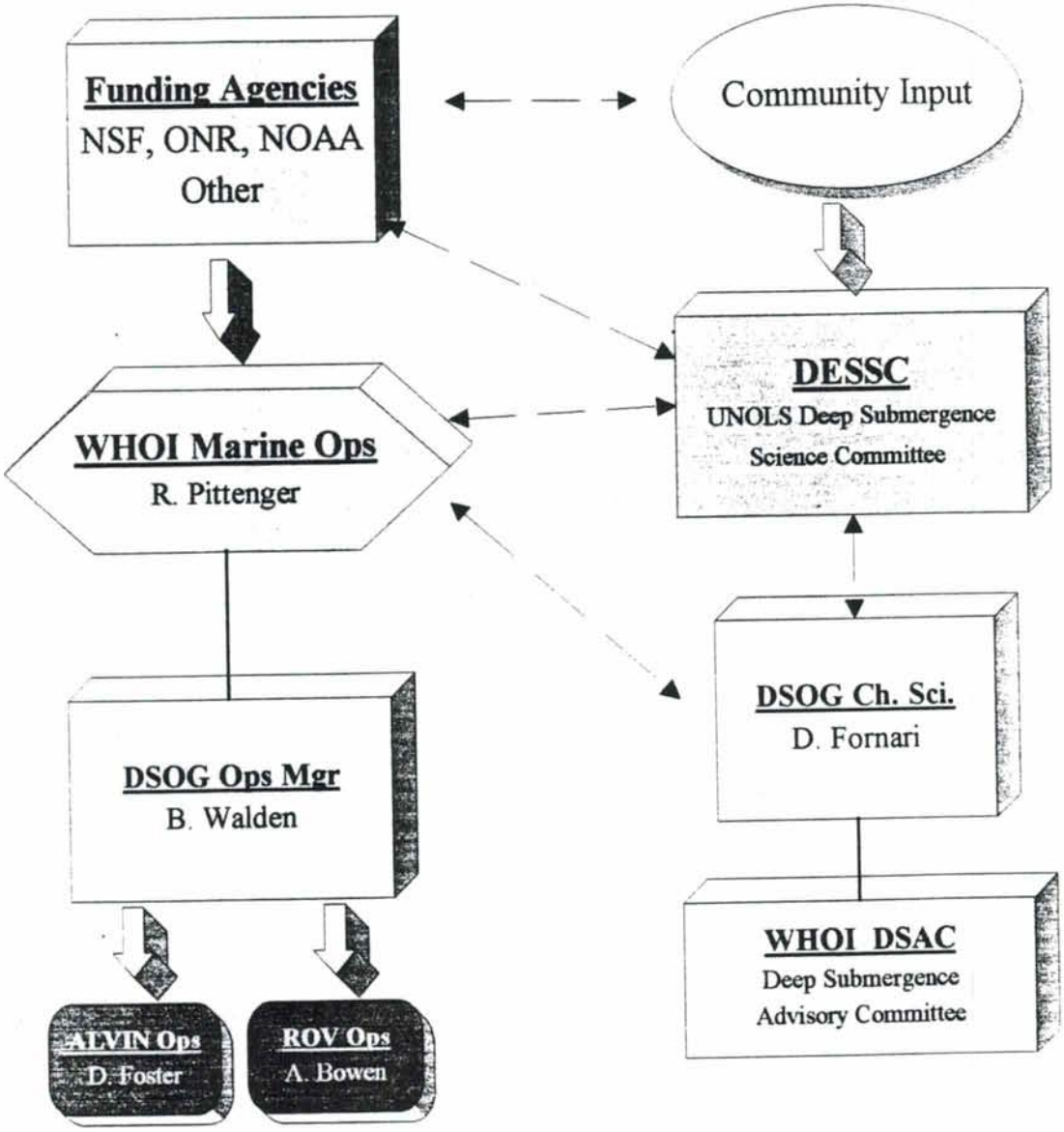
- **Marine Technicians (SSSG)**
- **Shipboard Data Management**
- **Shared Use Equipment**
- **Calibration Facilities**
- **Mooring/Rigging Shop**
- **Diving Program**

Organization

DEEP SUBMERGENCE FACILITY

Functional Relationships

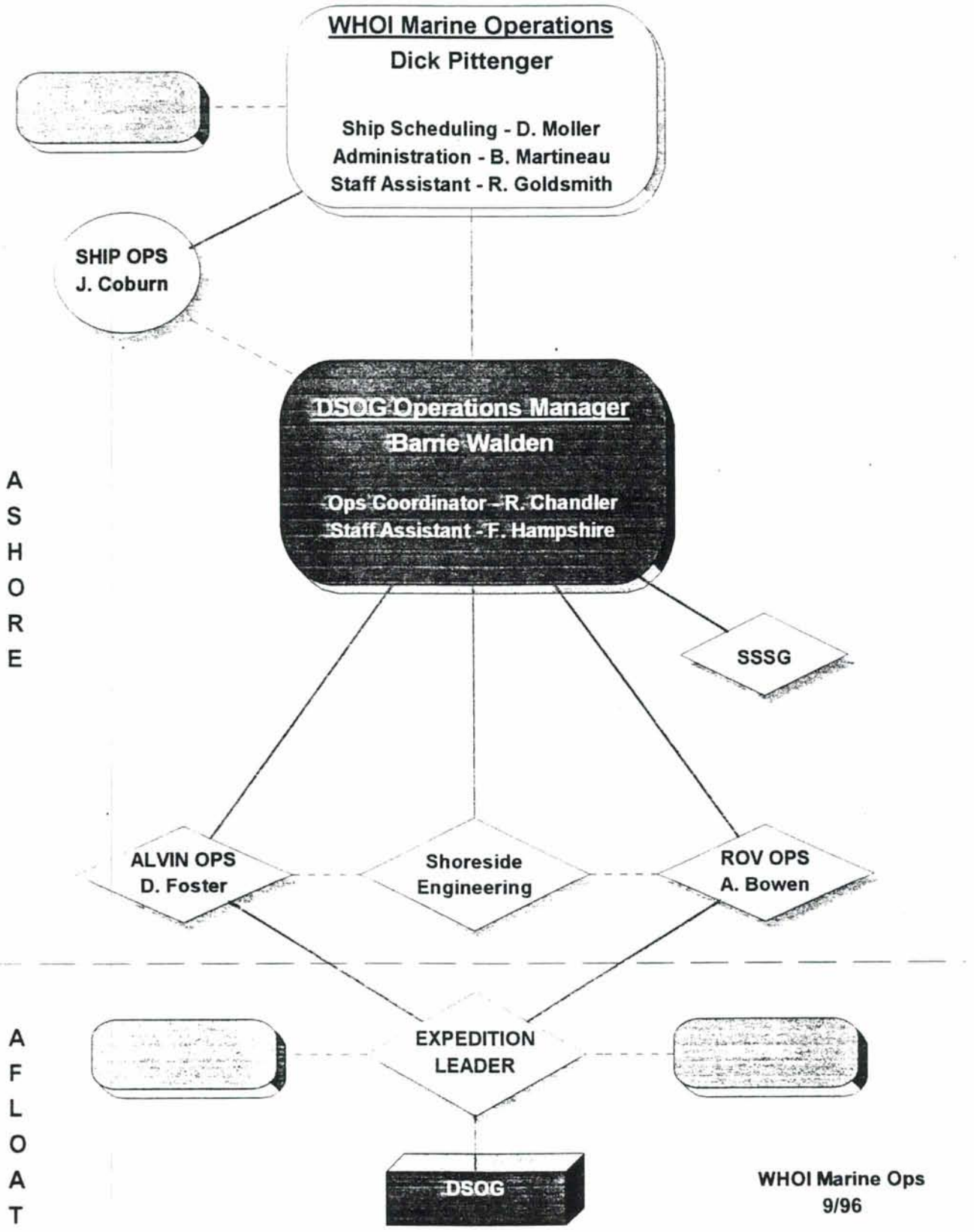
DESSC / WHOI / Funding Agencies



WHOI Marine Ops
9/96

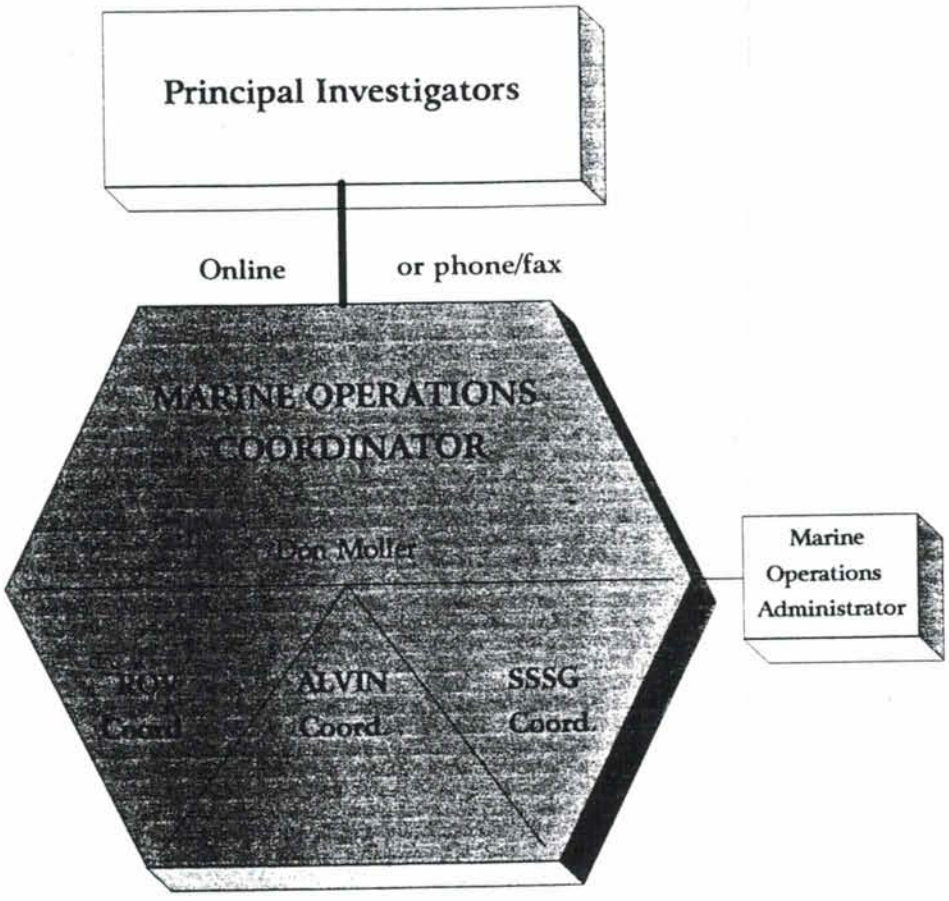
NATIONAL DEEP SUBMERGENCE FACILITY

Personnel



WHOI MARINE OPERATIONS

Centralized
Cruise Preparation and Science Liaison

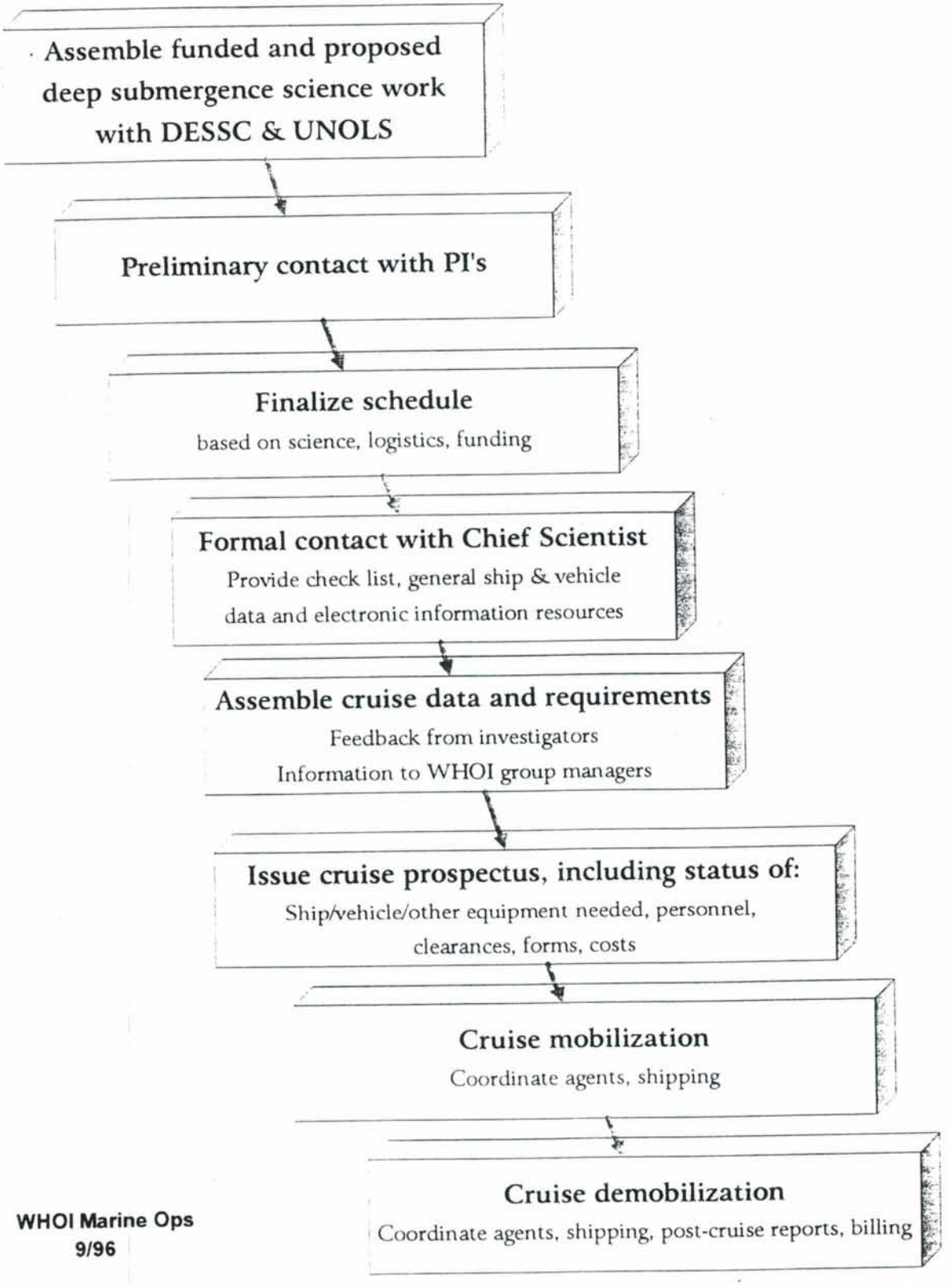


- SINGLE POINT OF CONTACT
- NO HAND OFFS -- Coordination stays with this office through all stages

  -Planning
  -Scheduling
  -Mobilization
  -De-mobilzation
  -Billing

WHOI Marine Ops
9/96

WHOI Marine Ops CRUISE PREP SEQUENCE



OPTIMUM INTEGRATED DSOG PERSONNEL REQUIREMENTS

Administrative Support (4)

Submersible Engineering & Operations Manager
Submersible Operations Coordinator
Marine Operations Administrator
Staff Assistant

Engineering Support (10)

ALVIN Project Leader
ROV Project Leader
Electrical Engineer (2)
Mechanical Engineer (2)
Structural/Drafting Engineer
Electrical Technician
Mechanical Technician
Computer Specialist/Programmer

Combined ATLANTIS Operations (12)

Expedition Leader
Electronics Technician (3)
Mechanical Technician (3)
Electrical Technician (2)
Navigator
Data Processor
Sonar Technician

Flyaway ROV Operations (19)

ALVIN/ATLANTIS	ROV/Other Ship
Expedition Leader	Expedition Leader
Electronics Tech (3)	Electronics Tech (2)
Mechanical Tech (3)	Mechanical Tech (2)
Electrical Tech (2)	Electrical Tech (2)
	Navigator
	Data Processor
	Sonar Tech

WHOI Marine Ops
9/96

Operating Modes

Operating Modes

- ***Alvin*** **and ROVs on** ***Atlantis***

  Pros: **Most cost-effective, efficient asset utilization**

  Cons: **Limited geographic/temporal coverage**

- ***Alvin*** **on** ***Atlantis*****, ROVs in fly-away mode**

  Pros: **Extended geographic capability**

  Cons:
  - **More expensive**
  - **Harder on equipment and personnel**
  - **2-3 months of ROV non-availability due to shipping in addition to actual ops**

Operation Models

A	=	Annual *Atlantis* Operating Cost	
a	=	Annual *Alvin* Operating Cost	= 1/2 A
r	=	Annual ROV Operating Cost	= 1/2 A
s	=	Annual *Alvin*/ROV Joint Operations Cost	= 2/3 A

- Combined Ops on *Atlantis:*
  - Assume ideal Schedule, 240-270 Operating Days
  - Six months A + a, three months A + a + r

WHOI Cost = A + s = 1 2/3 A

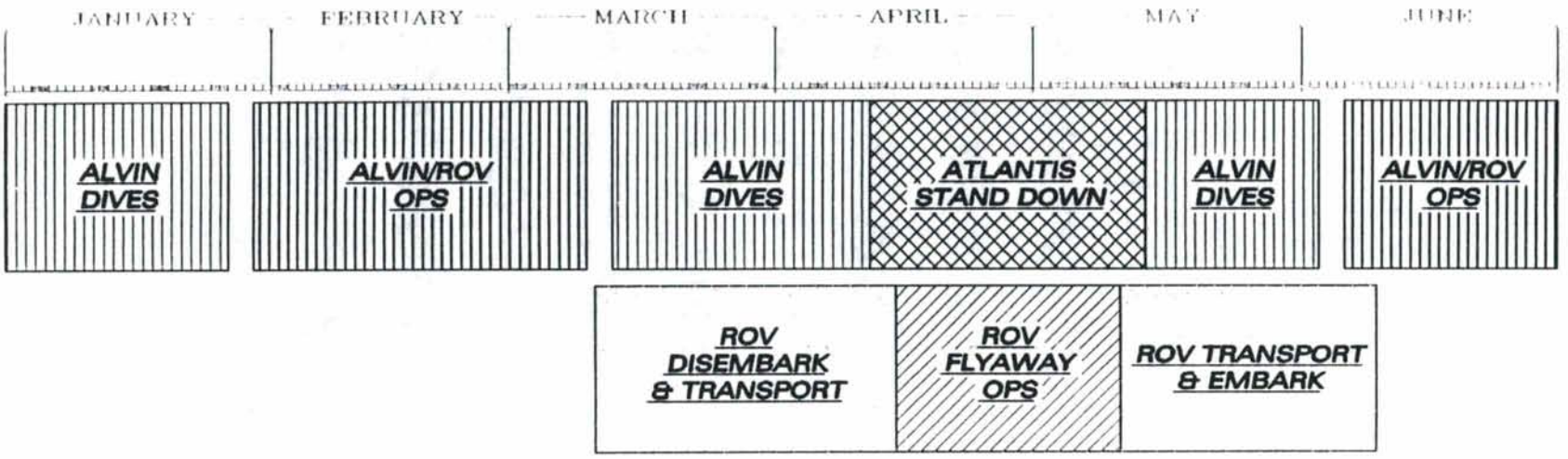
- Independent ROV Ops:

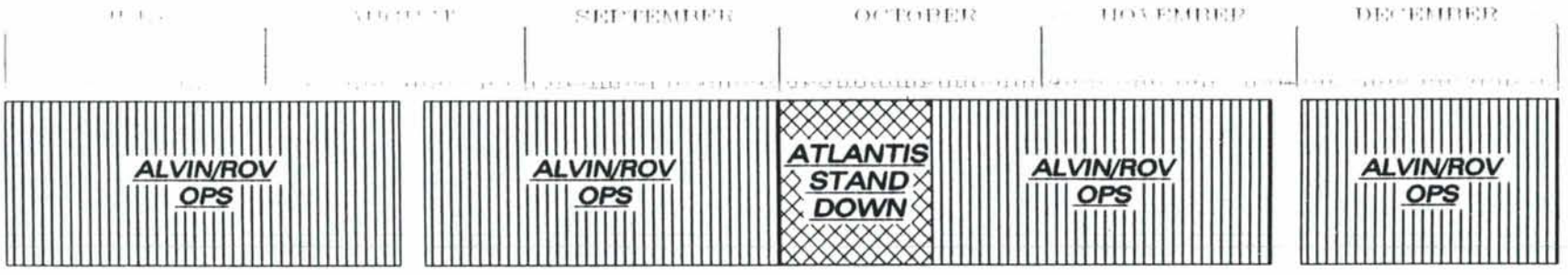
WHOI Cost = A + a + r = 2 A

- Plus -

- Second Ship Cost
- Shipping from and back to *Atlantis*
- Personnel Travel Costs
- Additional Manpower

IDEALIZED SCHEDULE
R/V ATLANTIS, ROV & ALVIN OPERATIONS

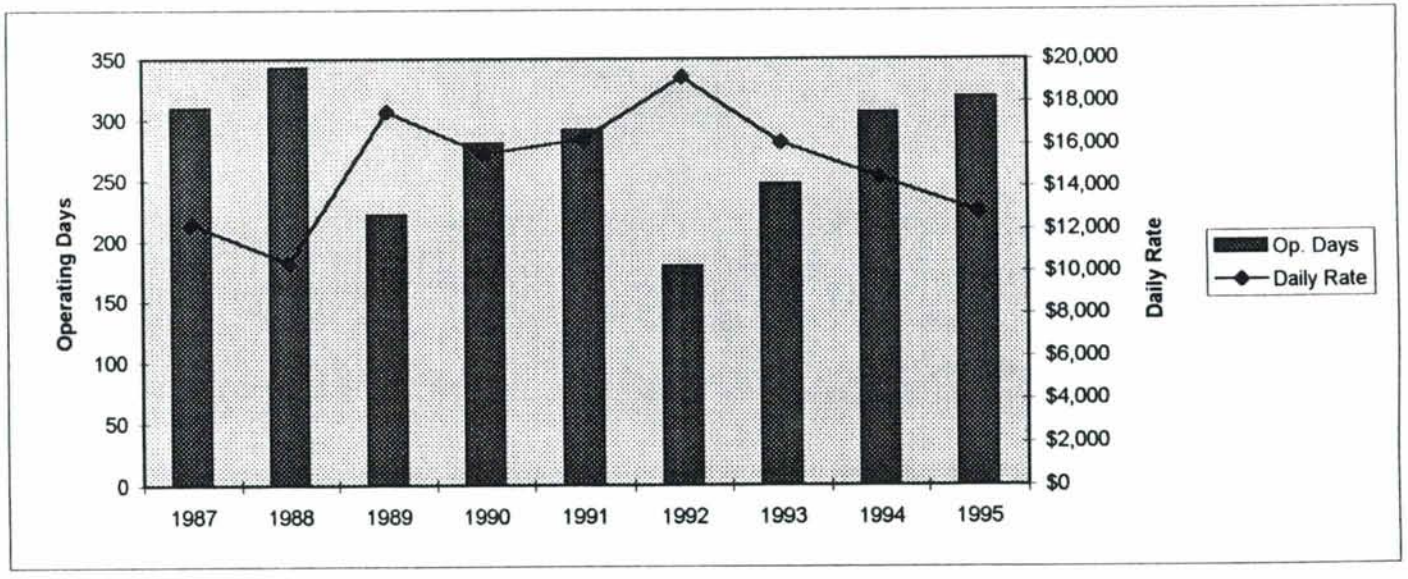


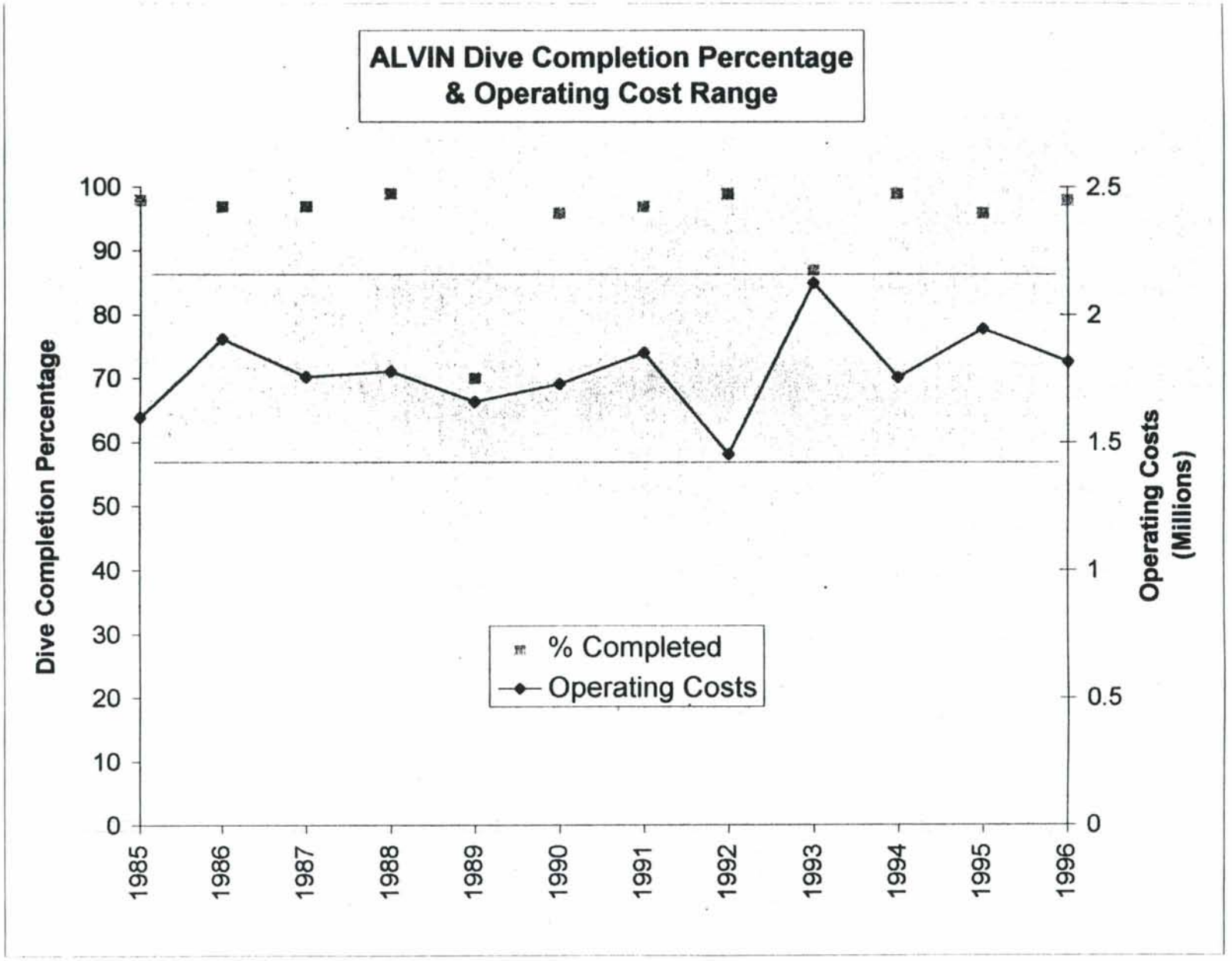


R/V Atlantis II

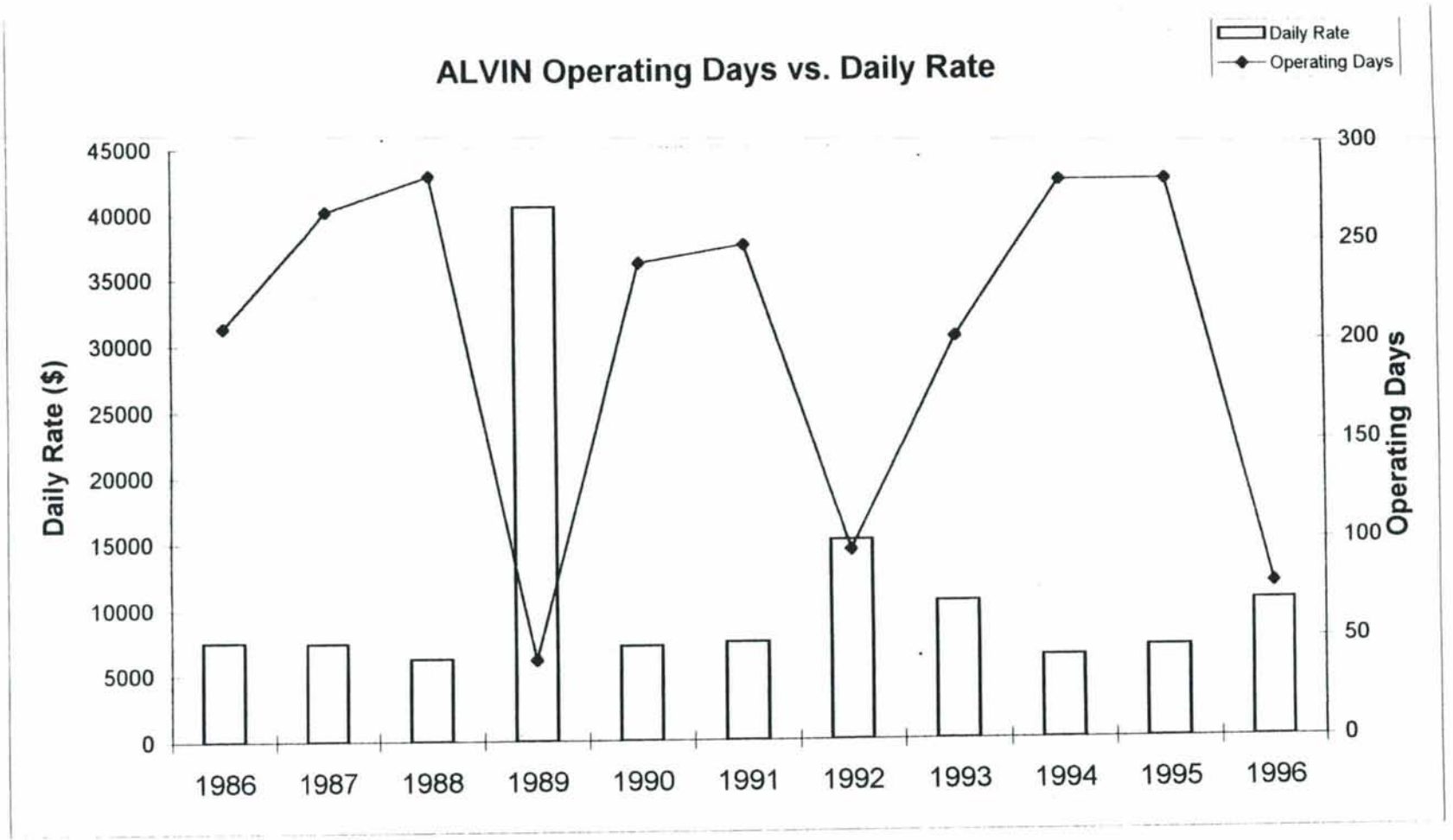
Yearly Costs

	1987 Actual	1988 Actual	1989 Actual	1990 Actual	1991 Actual	1992 Actual	1993 Actual	1994 Actual	1995 Actual
Op. Days	310	343	222	281	292	179	247	306	319
Days @ Sea	259	293	202	245	254	157	224	265	279
Daily Rate	$12,221	$10,380	$17,543	$15,531	$16,223	$19,167	$16,090	$14,440	$12,830
Total Costs	$3,788,596	$3,560,340	$3,894,546	$4,364,211	$4,737,116	$3,430,893	$3,974,344	$4,418,611	$4,092,790

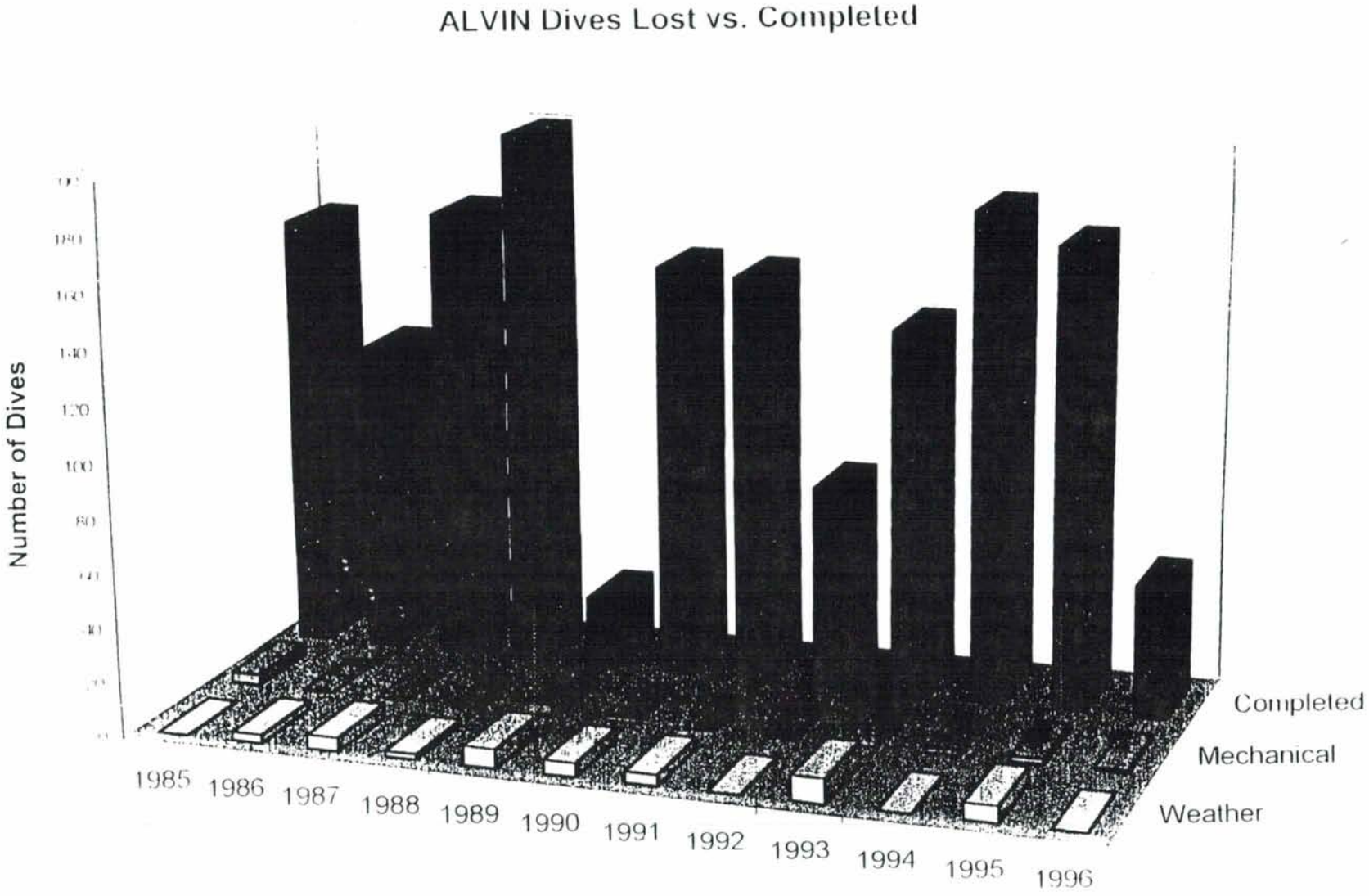




WHOI Marine Ops
9/96



WHOI Marine Ops
9/96


ALVIN Dives Lost vs. Completed
Number of Dives
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
Completed
Mechanical
Weather

Operational/Management Issues/Policy

Integrated Facility
Operational/Management Issues

Operational/Safety Issues/Policy

- ***Alvin*** **crew rest periods are primary concern during joint *Alvin* - ROV/tethered vehicle operations.**
- ***Alvin*** **pilots require 24-hour period between suspension of ROV ops and commencement of *Alvin* dive ops.**
- **ROV/tethered vehicle equipment safety is also a key concern.**
- **Turn-around time of 24 hours is the established, initial figure for the interval between submersible operations and ROV/tethered vehicle lowerings.**
- **Switch-over times for ROV and tethered vehicles will depend on various operational and logistical issues are approximately as follows: *Jason* to *ARGO-II* and vice versa - 12-18 hours, DSL-120 sonar to either *Jason* or *ARGO-II* and vice-versa - 6-12 hours.**
- **Definition of deep submergence tool suite and general operational criteria and logistics must be defined during planning stage of field work by PI and DSOG. Because equipment and personnel will be tailored on a by-cruise-basis, it is not reasonable to assume that a tethered vehicle can be substituted for *Alvin* or another vehicle in the field (on the fly as it were).**

Integrated Facility Operational/Management Issues (Continued)

Cost and Logistical Issues

- Advance planning and scheduling of deep submergence science programs are necessary for cost-effective, integrated deep submergence facility operations and efficient management of personnel.
- There are synergistic benefits to accrue from operating all National Facility vehicles on *R/V Atlantis* - for science programs and facility cost-effectiveness.
- There are some logistical and operational benefits to preserving fly-away mode of operations for ROV/tethered vehicles on other suitable UNOLS vessels.
- Projected operational models, facility costs, and scheduling impacts require well-established protocols between the Federal funding agencies, UNOLS and WHOI. Updating and revision of Memorandum of Understanding between the supporting agencies must accommodate to new integrated nature of the Facility and future projected operations.
- Adequate personnel/engineering support and long-range planning for facility vehicle/equipment upgrades should be factored into continued support for the National Deep Submergence Facility.

APPENDIX VIII

ALVIN UPGRADE/OVERHAUL - ITEMS AND ISSUES
Dan Orange and Cindy Van Dover
17 September 1996

HISTORY

June '95 Discussion at DeSSC Meeting - early overhaul and integration with Atlantis present an opportunity to increase functionality/upgrade systems.

Fall '95 Solicitation to community for input. Responses to Van Dover and Orange by Jan '96.

Feb '96 Preliminary list to WHOI for comment. Replies incorporated.

Spring '96 DeSSC (Perfit) discussions with funding agencies, DeSSC.

May '96 Prioritized list to DeSSC. Lengthy discussion at DeSSC meeting with operator, agencies.

Aug. '96 Schedule special DeSSC meeting with agencies, operator to discuss overhaul opportunities.

Sept. '96 Revised priority list, suggestions.

PRIORITIES (in order of importance)

1. Datalogger/video upgrade.

   This is essential for ALL kinds of science using ALVIN and needs to be matched to JASON. Data format needs to be user friendly, overlays for all video need to be standardized (with inherent flexibility), delivery to scientists needs to be routine and flexible, there needs to be a minimum standard of training for science users so that all scientists and pilots, including new users and trainees, are aware of all capabilities.

2. Add syntactic foam.

   This is my second priority because available science payload often does not match demand. This is an upgrade that ALL scientists can use to advantage -- no discriminating by discipline here. One of several #1 priorities of original DESSC list.

3. Power.

   Add wiring as needed to 3rd battery compartment. Power limitation is a big issue -- having a test bed seems valuable from both science and operator's view. DSOG also needs to collate post-dive data: (why were dives terminate? Pilot/battery stats?) to allow for power analysis.

4. (tie) Obtain dual head scanning sonar
4. (tie) Obtain 4 slurp pumps with chambers

Relatively low costs put these items higher on our list than they otherwise might be -- big gain, small bucks.

5. Laser ring gyroscope.

The existing gyro is archaic, and all scientists depend on good heading information.

6. Image infrastructure.

Incorporate the infrastructure (wiring, beta deck at no cost, etc.) necessary to upgrade imaging over the next three years (digital cameras, etc.).

7. Improve the in-hull 35 mm cameras.

All users identified that this is an essential component of the post-dive data, and that the present system needs upgrading. Although digital photography is on the horizon, the need for basic film photography will remain for some time.

8. Homer Probes

Obtain and incorporate Homer Beacon and 2-5 Responders. These allow a trivial return to a site of interest. Batteries last for 5 years.

9. Pencil cameras

Obtain 2 pencil video cameras and wiring for flexible placement on the sub.

10. (tie) Obtain an improved CTD pump
10. (tie) Obtain a flat LCD monitor

11. Obtain a new set of push cores with core catchers

Van Dover/Orange Essential List

Items 1-7 must be incorporated at a minimum. 8-9 offer substantial capabilities at a relatively low cost. 10-11 are important, and should be included if the work is required during overhaul.

Comments/Other Issues:

Power training sessions.

DeSSC strongly recommends that the operator and the committee utilize the AGU meeting to raise the issue of power usage with the community. Furthermore, a power training video would be a great benefit to the scientists, and could be viewed in the galley immediately following the exposure suit video at the beginning of the cruise.

VB System

The VB system will need to be upgraded in the near future, although we hope that the current system works until the next overhaul. DSOG needs to design and plan for VB replacement this overhaul.

Navigation

The number of transponders available "free" (transparent cost) to science needs to be increased. The current number of 4 for 15 dives is inadequate. This may require the purchase of some transponders now.

In-Hull Navigation Receiver

The existing receiver is a custom-built box, and is outdated and difficult to repair. We need to replace this with an off-the-shelf, well-documented and supported system. This was identified as a high priority among the community and the committee. This may not be covered in the navigation proposal and needs to address during this overhaul.

Already paid for; to be incorporated during overhaul:

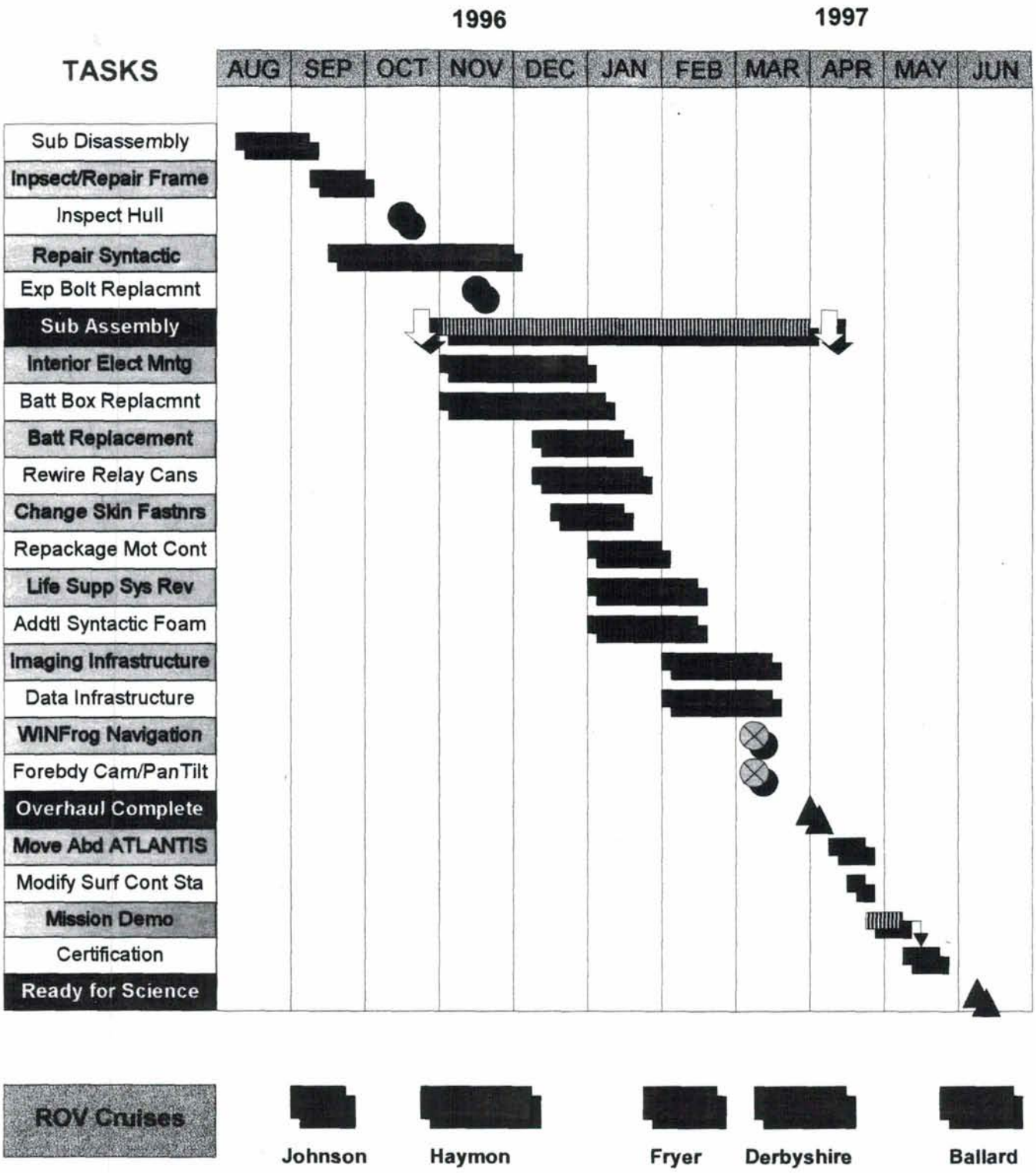
- pan and tilt
- new 3 chip video camera
- Domed housing for video cameras (Ballard to acquire, available to DSOG?)

Other items discussed at the May '96 DeSSC meeting:

- Digital imaging for ALVIN/Jason/ARGO (separate proposal)
- Remote data logging via inductive coupling (see Fornari memo)
- Acquire next-generation GeoCompass (utilizes fluxgate magnetometer)

APPENDIX IX

ALVIN OVERHAUL SCHEDULE



APPENDIX X

WHOI-DSOG EQUIPMENT UPGRADE PROPOSAL
SUGGESTED APPROACH

Based on a review of the DESSC upgrade priority list and internal discussions within WHOI-DSOG the following staged approach towards upgrade of vehicle systems is suggested.

A proposal can be submitted by Oct 15 that includes the following items (we have listed them to follow the priority order of the DESSC list):

1. **Datalogging hardware/software upgrade** - various options have been researched and discussed within DSOG. We are now at the point where we could fruitfully conduct testing of several hardware options and begin to write the code that integrates DSOG vehicle and science datalogging requirements for Alvin, Jason, and the tethered vehicles. We are prepared to propose a first stage of the new datalogging approach which would include modest acquisition of currently available hardware and development of modular software.
Based on current overhaul work and expected 1997 scheduling we forsee that Alvin and ROV/tethered vehicles will continue to use existing datalogging but that newly developed datalogger and software can be phased in during the late 1997-1998 time period.

2. **Syntactic Foam for Alvin and Jason-** DSOG has reviewed the options for placement of new foam on Alvin, and supplementary foam for Jason to increase payload capability. We will propose to fill approximately half the 3rd battery bay with a foam block which should provide 100-150 lbs. of additional buoyancy. In addition, we propose to purchase additional foam blocks for Jason so that an increase of approximately 50 lbs to its current payload specs. can be achieved.

3. **Alvin Power-** DSOG is continuing to experiment with the new Pb-acid plate design supplied by vendors and will be constructing three (3) new batteries tanks for Alvin during the current overhaul. In addition, as part of the overhaul, wiring will be run to accomodate a 3rd battery, and the necessary mechanical/electrical components to handle a 3rd battery will be installed. DSOG is continuing to study the weight/buoyancy implications of the addition of a 3rd battery for periodic use depending on science and engineering requirements.

4. Dual-head scanning sonar/altimeter and slurp pumps- We agree that purchase of a replacement, intermediate range sonar to replace the outdated CTFM is important for both science and operational reasons. We will propose to purchase a dual-head Imagenix scanning sonar in order to provide redundancy with the unit now operating on Jason and ARGO-II. The Mesotech unit on Alvin has proven to be troublesome from a maintanence perspectieve and is not well supported by the vendor.
We agree that most biological programs require the ability to slurp samples of various sizes from the sea bed. We will use off-the-shelf components to develop simple slurp samplers with individual sample containers (of various, interchangeable sizes) that can be used on Alvin and Jason.

5. 35mm cameras, in-hull- We will include in the proposal the purchase of 2 new, 35 mm, hand-held film cameras each with ~20-70 mm zoom lenses, and 2 digital snapshot cameras.for use by scientists in Alvin.

6. Pencil Cameras, 1-chip and 3-chip video cameras and wiring- as part of the overhaul effort we will ensure that adequate wiring to the forebody of Alvin is installed to accomodate additional camera connections. In addition, the inhull wiring from the penetrators to the video recorders will be replaced. We will propose to purchase 2 DSP&L pencil cameras. DSOG will have access to the new MBARI design 3-chip camera which has been purchased by R. Ballard and will be maintained by WHOI-DSOG. Funds in hand which were originally earmarked for purchase of a new generation 3-chip will be used to purchase two or three (2-3) high-resolution, small (~4 x 6") 1-chip DSP&L cameras which have proven very successful in recent use on Jason. This will provide modular redundancy and spares throughout DSOG for high-resolution 1-chip video imaging. Data overlaying will be done post-dive using industry standard SMPTE embedding, this will permit optimization of master video image quality during recording and flexibility of data overlay type and placement depending on individual science requirements. The equipment to permit this solution will be included in the Upgrade Proposal.

7. Pan and Tilt- WHOI-DSOG has, over the past 18 months, reviewed and experimented with commercially available pan-and-tilt units and has had extensive dialog with both vendors and other vehicle operators. Based on this work, and the consistent experience of other operators that modifications of various kinds had to be made to commercially manufactured units, DSOG proposes to use the existing ~$25k in funding originally provided by the 1994 Imaging Upgrade Proposal to manufacture two (2) pan-and-tilt units using the same design and materials as the current Jason manipulator joints. This will result in a rugged, electrical pan and tilt that would be able to easily handle the new 1-chip cameras and easy to maintain. Mounting of the currently available 3-chip cameras on either Alvin's or Jason's manipulator will provide additional pan-and-tilt capability for those science programs that require very high resolution imaging capabilities. DSOG has reviewed the drawings and electrical/mechanical components of the Jason manipulator joints and we are costing out the fabrication of two (2) pan-and-tilt units. We believe that we can accomodate all or most of these costs within the $25k originally provided for the purchase of one pan-and-tilt unit. If a modest amount of additional funds is determined to be required to complete the construction of the two (2) units we would include those costs in the Upgrade Proposal.

8. Flat LCD monitor- we will complete our review of available LCD monitors, request demos from vendors, and propose to purchase one such monitor for evaluation purposes in Alvin.

9. Power and Science Training Video and Short Courses - DSOG will develop documentation and video tape that can be provided to scientists and be available on-line via the WWWeb which will help with proposing science, planning for cruises, and implementation of vehicle assets for science programs that cover logistical and operational issues pertaining to science data acquisition, power consumption (for Alvin programs), sampling and survey strategies, and datalogging information and data processing options. This information will also be offerred periodically at national meetings in a short-course format run byb DSOG members.

10. Purchase of additional Benthos Transponders- given the increasing need for transponder navigation for various types of deep submergence science programs we propose to purchase five (5) additional Benthos TR6000 recoverable transponders for use by DSOG. DESSC, the funding agencies and DSOG need to discuss issues related to transponder use during science cruises as there is are personnel and material impacts on the operational budget which result from navigational requirements for science programs. If transponder requirements for various science programs can be better identified well in advance, then the Operations Proposal for each year can be tailored to provide the requisite number of transponders for each cruise without the need for a fixed number of transponders based on a per dive/lowering program. This revision of the transponder issue is important considering the number of ROV and tethered vehicle ops that will be carried out in 1997 and into the future, some of which will be in tandem with Alvin operations but not necessarily in the same geographic location.

Items to Discuss

• INDUCTIVE COUPLE RS232 LINK AND REMOTE TEMPERATURE PROBES, AND MODULAR CONNECTIONS TO ALVIN AND JASON MANIPULATORS - WOULD LIKE TO INCLUDE THIS IN THE UPGRADE PROPOSAL

• JASON ELEVATOR IMPROVEMENTS
WOULD LIKE TO INCLUDE THIS IN THE UPGRADE PROPOSAL

• HOMER PROBES - SCIENCE SPECIFIC OR FACILITY REQUIREMENT?

•THYRISTOR CONTROL OF STROBES FOR EXTERNAL 35 MM CAMERAS (CONTINUED DEVELOPMENT AND RESEARCH - POSSIBLY VIA INTERNAL-WHOI GREEN AWARD ?)

•. VB SYSTEM REDESIGN (PRELIMINARY ENGINEERING WORK TO BE INCLUDED IN A PROPOSAL THAT WILL BE SUBMITTED IN 1997)

•NAVIGATION - IN HULL RECEIVER - (D. YOERGER ET AL. DEVELOPMENT EFFORT)

APPENDIX XI

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S. MILLICK - ONR
G. SMITH - NOAA

5 pages TOTAL

CC: M. PERFIT - DESSC CHAIR
J. BASH AND A. DE SILVA - UNOLS OFFICE

FROM: DAN FORNARI - WHOI

DATE: SEPT. 17, 1996

SUBJECT: REVISED DESSC 3RD PARTY TOOL POLICY

Attached please find the revised 3rd Party Tool Policy that has incorporated the various comments from agency reps. We would like to briefly discuss the changes and hopefully come to closure on this matter at the DESSC meeting tomorrow.

Please take a few minutes to review it and come to the meeting with any further changes/comments that you feel should be made. I will bring overheads of the following pages to the meeting.

Thanks for your assistance in working on this issue.

Best Regards,

Dan

Third Party Tools on
National Deep Submergence Facility Vehicles
SUGGESTED REVISIONS IN BOLD
Issues to Discuss in Bold Italics
9/17/96

Over the past few years DESSC has made progress on formulating policy and guidelines for third party tool development and use on Alvin and the ROV/towed systems operated by the UNOLS National Deep Submergence Facility Operator, Woods Hole Oceanographic Institution's Deep Submergence Operations Group (WHOI-DSOG). In order for scientists to be able to effectively plan and conduct their research, and especially when it involves specialized tools that will be operated from the vehicles that have either a specific technical/scientific purpose, or could have applications to a broader group of users, it was considered important for DESSC to formulate and distribute a set of Third Party Tool guidelines. **These guidelines have been reviewed by the Federal Funding Agencies (NSF, ONR and NOAA), and will be considered when proposals are received for equipment/tool development, and used to evaluate the benefits and projected costs of Third Party Tools beyond the project-specific work that provides the original impetus for the development of the tool.**

Third party tools are defined for this memo as devices **funded and developed** outside of the **National Deep Submergence Facility**, with the emphasis on those tools that may be useful for the broader, multidisciplinary deep submergence research community. New tools are required for the increasingly complex and multidisciplinary nature of deep submergence-based research in mid-water, hard-rock and soft-sediment benthic environments. In the coming years, the advent of deep ocean sea floor observatories and time-series studies will undoubtedly lead to new requirements for sampling, monitoring, and communications devices that will be operated from the National Facility vehicles. Advances in sensor technology, materials, and engineering must be incorporated in a manner to effectively support the research programs and enhance the US deep submergence capability. In order to proceed with Third Party Tool development programs in a coordinated, safe, and cost-effective manner, the Federal Funding agencies are encouraging proponents of new deep submergence related tools to communicate their ideas with the DESSC and WHOI-DSOG in order to be sure that issues

relating to future operating, maintenance, and mobilization costs are addressed in the original proposal where applicable.

Based on discussions with the community at various DESSC meetings, and in consultation with the Federal funding agencies, DESSC envisions a procedure that **allows technical review** by the DESSC, and operational assessment and recommendations by the WHOI-DSOG with respect to proposed Third Party Tool development for the deep submergence vehicles. DESSC realizes that this must be done without unnecessarily burdening the investigator, but in a way that will enhance the **peer** review process, and provide the agencies with information that is otherwise not available. **The scientific merit of the proposed tool development, its operational viability, and its general applicability to a wide spectrum of deep submergence facility users are all important topics that should be addressed by the proposer. In order to assist the federal agencies with the process of Third Party Tool assessment**, DESSC has established a Technology Subcommittee, that comprises several DESSC members with appropriate technical and scientific background to address Third Party Tool issues, and to provide advice to the Federal funding agencies and WHOI-DSOG **on technology issues related to science equipment.**

Outlined below is the accepted Third Party Tool Policy that has been formulated **jointly** by DESSC, the Federal Funding Agencies and WHOI-DSOG, and which should be referred to by scientists planning to propose the development of a scientific "tool" that is to be operated from one of the National Deep Submergence Facility vehicles. Any questions concering this policy should be directed to either the UNOLS office or the DESSC Chair.

NATIONAL DEEP SUBMERGENCE FACILITY
THIRD PARTY TOOL POLICY
REVISED DRAFT 9/17/96

1. Investigators considering submitting a proposal for developing a Third Party Tool are encouraged to submit a "letter of intent to propose" to the DESSC - Technology Subcommittee for initial comment and review. The Subcommittee and the vehicle Operator **will** evaluate the information provided, and respond with a letter to the investigator with comments and suggestions in a timely fashion. **Feedback from DESSC can be used by the proposer** when submitting a formal proposal to the funding agency. Tools that could be utilized on a variety of deep submergence assets available to U.S. investigators would obviously have greater potential of use, and interfacing for various types of vehicles should be encouraged.

2. Proposals submitted to the funding agencies for development of scientific instruments or tools will be reviewed under the applicable agency peer review system.

3. If the proposal is for a Third Party Tool with possible extended use beyond the proposed **science** work, the subsequent operation and maintenance costs associated with using the tool should be estimated and shown. ***Investigators should be prepared to support the continued maintenance of the tool via the funding received for the tool development and implementation, or include a long term maintenance plan in the proposal that includes providing funding for the vehicle Operator to carry out those tasks.*** **It is concievable that this process may involve sequential proposals.**

4. If a Third Party Tool becomes widely used by the scientific community, and its routine availability and support **on National Deep Submergence Facility Vehicles are considered important** to the conduct of science, then, based on: 1) community demand, 2) **advice to the Funding Agencies by** the DESSC Technology Subcommittee, and 3) a technical and operational review by the vehicle Operator, equipment developed by a third party could become a permanent addition to a vehicle system, with the assets transferred to the vehicle Operator for operation and maintenance. **If Third Party Tools are transferred to the vehicle Operator, the appropriate support costs should be made part of the annual operating budget of the vehicle Operator. In most cases it is not reasonable to assume that the costs for maintaining and operating a new tool for science use can be absorbed by the existing operations budget.**

5. **Unless long-term funding for the support of a Third Party Tool is provided for, the** responsibilities of the vehicle Operator should not go beyond providing detailed interface specifications, installing equipment, evaluating safety and operational requirements, and cooperating on testing of new equipment. At sea repair, maintenance and spare parts for third party equipment shall be provided by the user or designated technician funded by the PI.

6. The DESSC will report the status of Third Party Tools to the community at the annual general meeting, including a review of tools under development and scheduled testing. In addition, a summary of tools available to the community, including the primary contact, will be maintained by DESSC and be made available with online information provided by the vehicle Operator.