

APPENDIX X

EQUIPMENT UPGRADE PROPOSAL SUGGESTED APPROACH

9/18/96

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 foresee 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 accommodate 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sonar/altimeter and slurp pumps- We agree that purchase of a replacement, intermediate range sonar to replace the outdated CTFM is important for both science and operational reasons.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-11. The Mesotech unit on Alvin has proven to be troublesome from a maintenance perspective 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 accommodate additional camera

connections. In addition, the in-hull 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 accommodate 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 offered periodically at national meetings in a short-course format run by 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 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)