2006 MATE Center/MTS ROV Committee ROV Competition
Mission Task Specifications

EXPLORER CLASS

Mission #1: Complete the central node.

Teams must transport the electronics module from the surface to the trawl-resistant frame, install the module in the frame, open the frame door, and insert the submarine cable connector into one of the open ports on the electronics module.

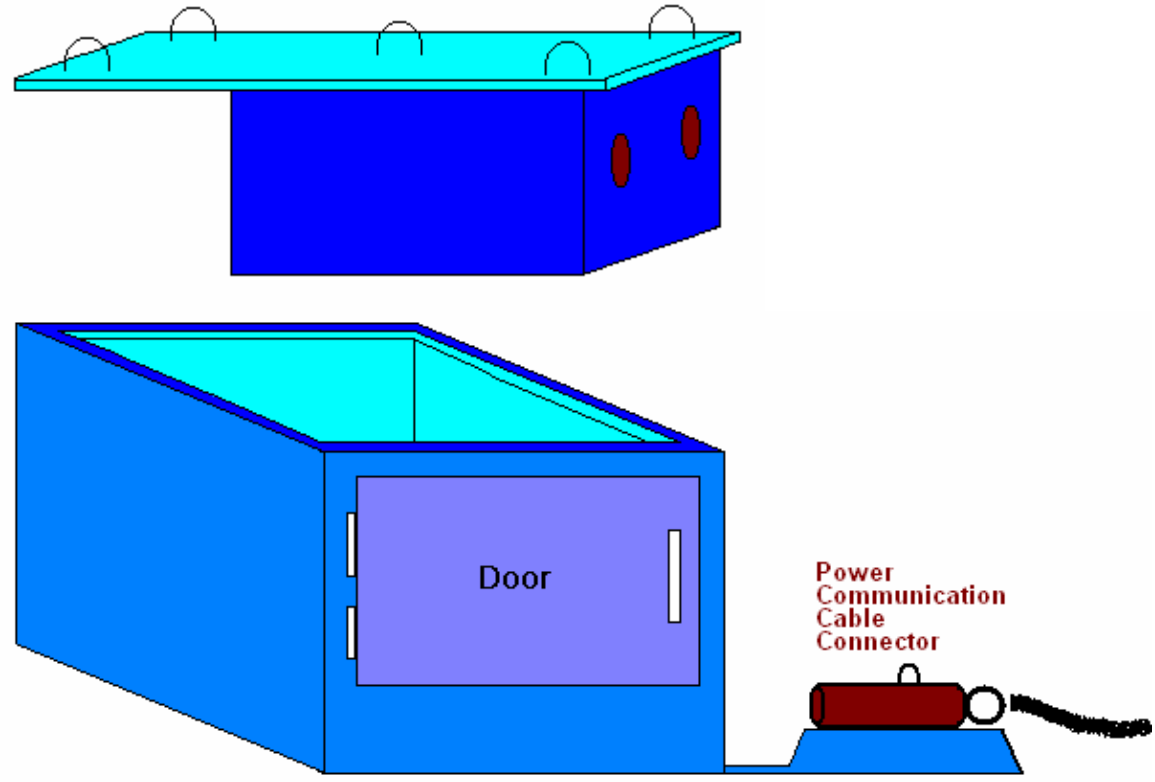


Figure #1: The electronics module and the trawl-resistant frame.

The electronics module will be composed of a top, flat horizontal surface and body that hangs below. The top, horizontal surface of the electronics module will be 60cm long x 44cm wide and constructed of clear Plexiglass. The top surface will be larger than the body of the electronics module to aide in deployment and proper orientation of the electronics module into the frame.

The body of the electronics module, hanging below the top surface, will be 40cm long x 35cm wide x 30cm tall. There will be two open ports on one vertical side of the electronics module. These ports will be located approximately ½ the distance from the bottom of the module; the distance between the two ports will be 8cm. One port will be labeled "**Power Cable**" and the other "**Instrument Cable**." The **EXPLORER** class electronics module will weigh no more than 1.5kg in water.

A U-bolt will be attached in each corner and in the center of the top, horizontal surface of the electronics module to assist in deployment. These U-bolts will have a 2 inch cross section and protrude more than 2 inches above the top, horizontal surface.

The frame will be 75cm long x 50cm wide x 40cm tall. The opening in the top of the frame will be 57cm long x 40cm wide. This will allow the body of the electronics module to hang down into the frame, held in place by the top, horizontal surface. A guide rail along the top of the frame will help to position and hold the electronics module properly within the frame. The top, horizontal surface of the electronics module will fit just within this guide rail, assuring that the bulk of the module hangs properly below. When the top, horizontal frame is set within the guide rail, the open ports on the electronics module will be accessible when the door of the frame is opened.

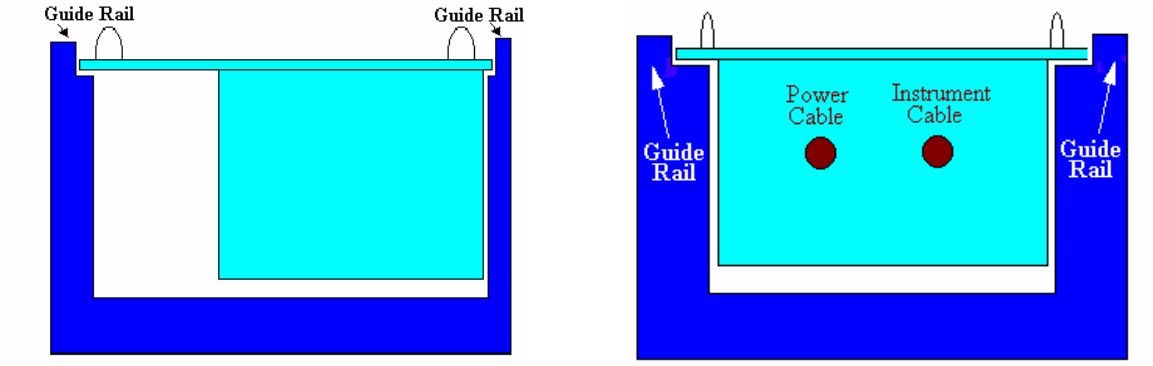


Figure #2: Cut away side view and cut away front view of the frame with the electronics module inserted. The top, horizontal surface sits just within the guide rails.

The door will be made of mesh with a solid frame. The door will be attached to the frame by hinges that require less than 1N to open. The door handle will be 20cm long (internal length), constructed from ½ in PVC, and protrude 5cm from the door frame. The handle will be oriented vertically and located on the right side of the door.

Once the door is opened, the power/communication connector must be inserted into the proper port. This port will be labeled **Power Cable**. The port will be circular, 7.5cm in diameter x 7.5cm deep. The closed end of the port will have Velcro hooks.

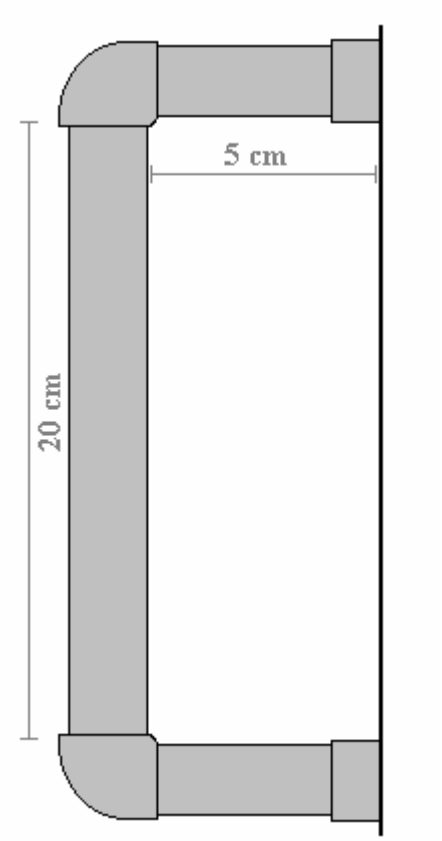


Figure #3: Size and shape of the door handle.

The power/communication cable connector will rest on a small platform approximately 20cm from the corner of the frame. The placement of the cable platform will not hinder the opening of the door. The power/communication cable connector will be 20cm long and constructed from 1-inch PVC. Small stabilizers, as well as internal weights and buoyancy, will be used to keep the connector upright. The connector will weigh less than 0.5kg in water. The connector must be lifted from the platform (it will not be attached to the platform) and inserted into the appropriate port of the electronics module.

The connector will have two methods for lifting. A U-bolt will be attached to the top, horizontal surface and a PVC ring will be attached to the "back" vertical end where the submarine cable also attaches. Industrial-strength Velcro loops will be attached to the "front" end of the submarine cable connector. When properly inserted, the Velcro loops will secure the connector in the open port. A 3m length of 16-gauge speaker wire will simulate the submarine cable.

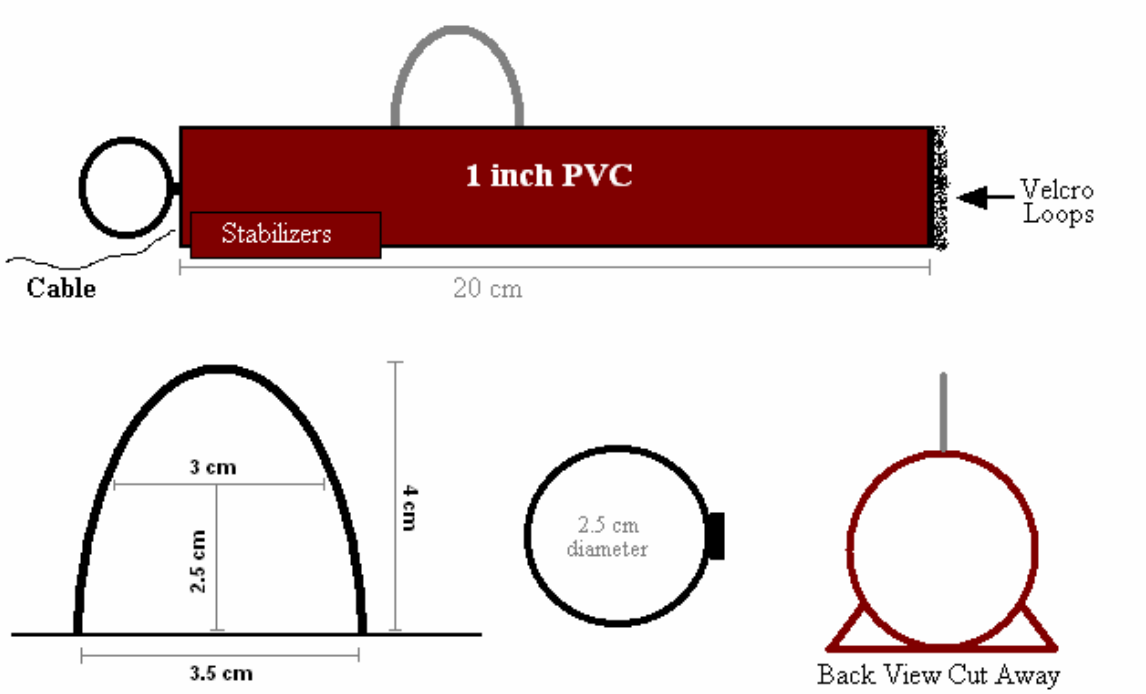
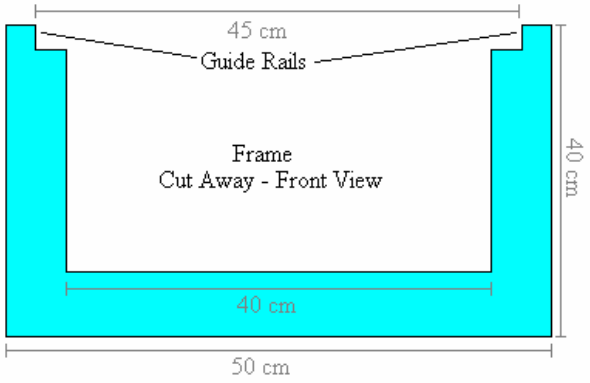
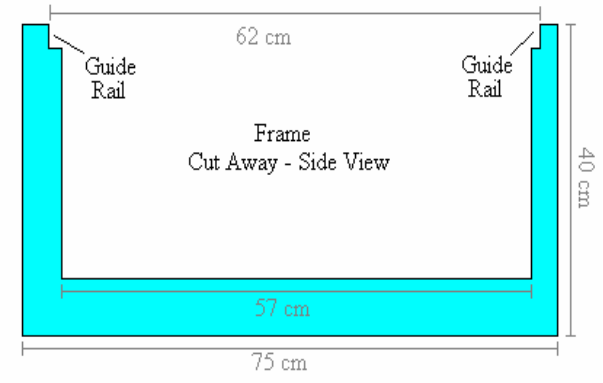
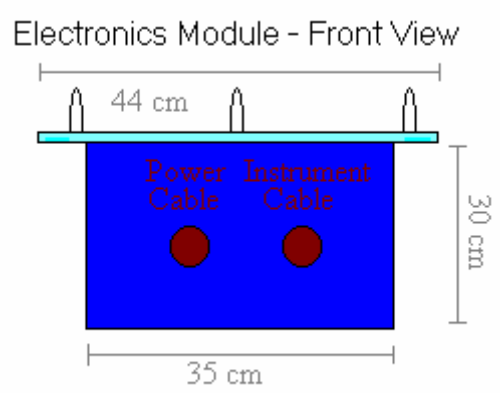


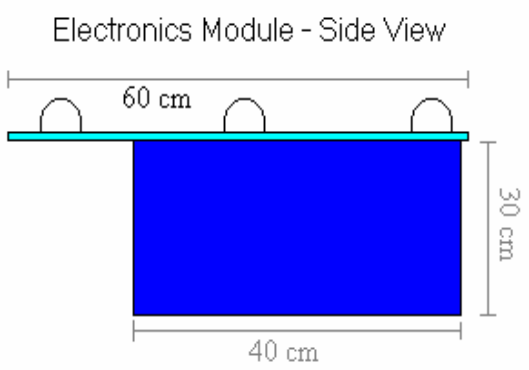
Figure #4: Power/communication cable connector.

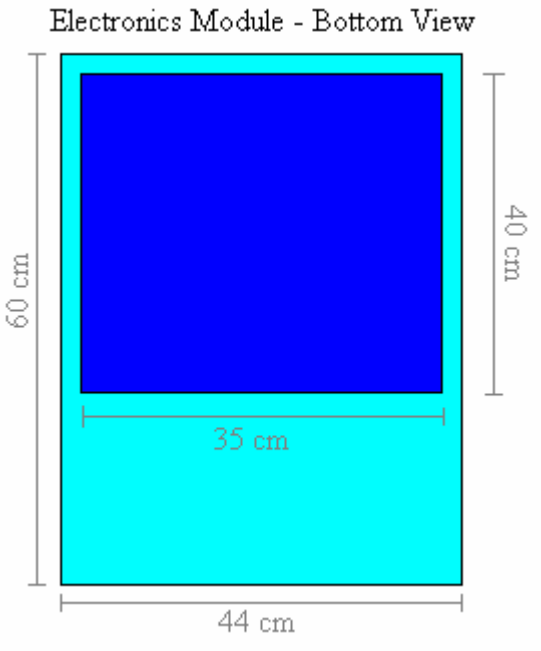
The following diagrams detail the sizes, shapes, and features of the electronics module and the frame.











Mission #2 – Lay instrument cable through assigned waypoints and connect it to the central node.

An instrument package deployed on a previous mission must now be connected to the central node to establish power and communication links. Your ROV must lay a cable along a route that consists of 4 waypoints.

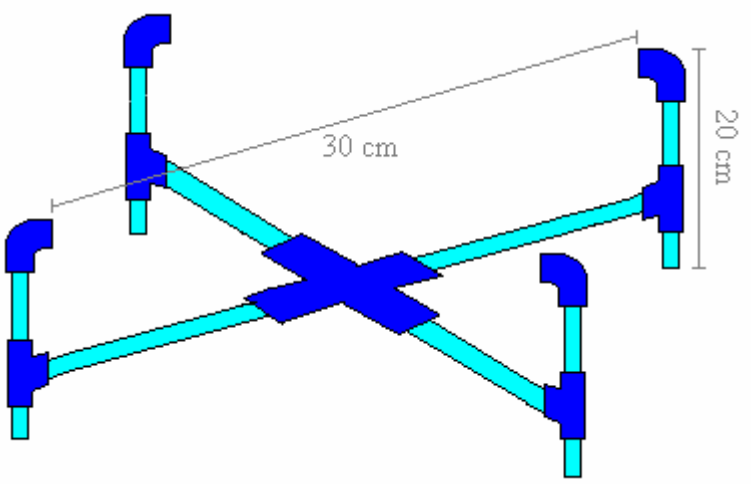


Figure #5: Waypoint design

Each waypoint will be an "X" with a distance of 30cm between two opposing points. The waypoints will be constructed of ½-inch PVC pipe and connectors. There will be a 20cm vertical PVC post in each corner. The cable must be laid through these vertical posts. Provided the cable is "inside" at least one of these posts, that waypoint is considered successfully crossed. A small elbow bend at the top of each post will facilitate holding the cable within the waypoint. If the cable slips out of a waypoint before the connector is inserted into the open port of the electronics module, that waypoint will not be considered completed. Each waypoint will be sufficiently weighted or bolted to the bottom so that it will not move when a cable is laid through it.

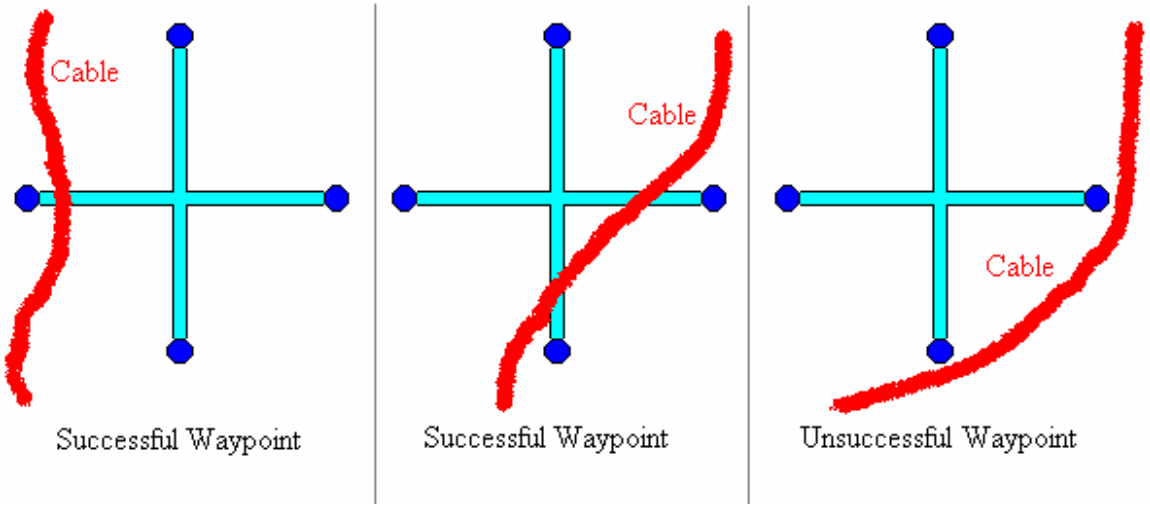


Figure #6: Successful versus unsuccessful waypoints

The cable will be simulated by ¼-inch, braided, nylon rope; a connector will be attached to the end of the rope. The cable will be coiled in a milk crate container on the bottom near the instrument package. The instrument connector will be identical to the power/communication cable connector (see Mission #1). The connector will have two methods for lifting. A U-bolt will be attached to the top, horizontal surface and a PVC ring will be attached to the "back" vertical end where the submarine cable also attaches. Industrial-strength Velcro loops will be attached to the "front" end of the submarine cable connector. When properly inserted, the Velcro loops will secure the connector in the open port of the electronics module. The port will be labeled **Instrument Cable.** The port will be circular, 7.5cm in diameter x 7.5cm deep. The closed end of the port will have Velcro hooks.

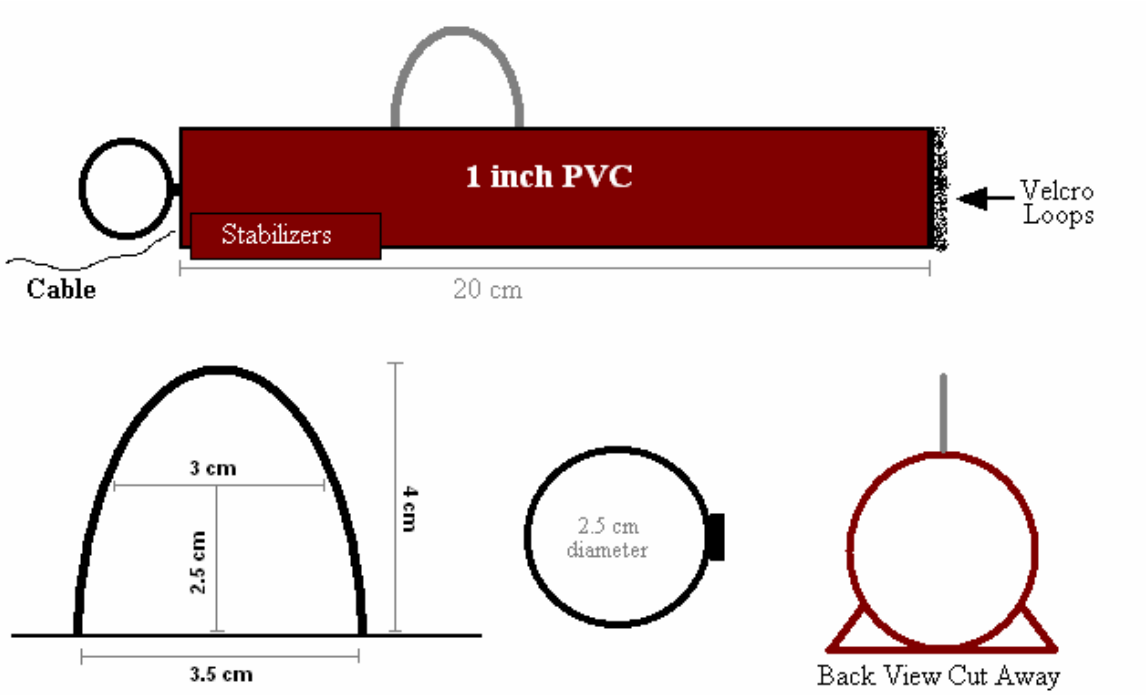
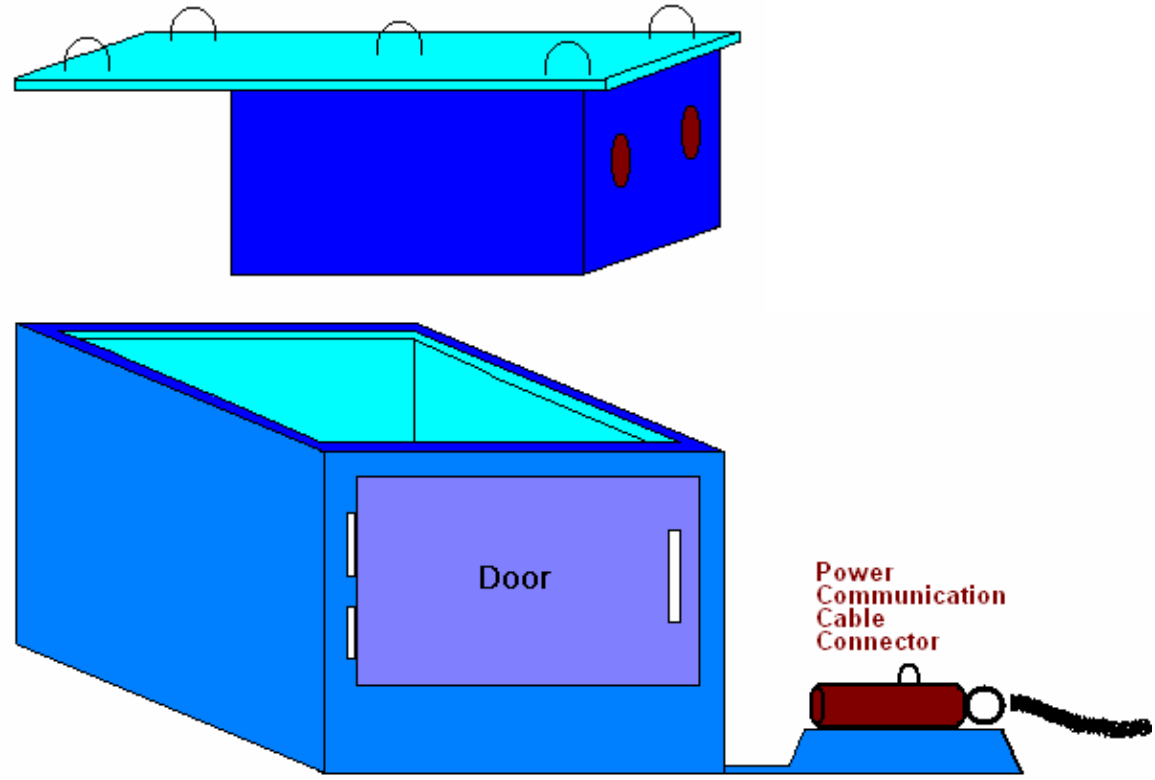


Figure #7: Instrument package cable connector.

RANGER CLASS

Mission #1: Complete the central node.

Teams must transport the electronics module from the surface to the trawl-resistant frame, install the module in the frame, open the frame door, and insert the submarine cable connector into one of the open ports on the electronics module.



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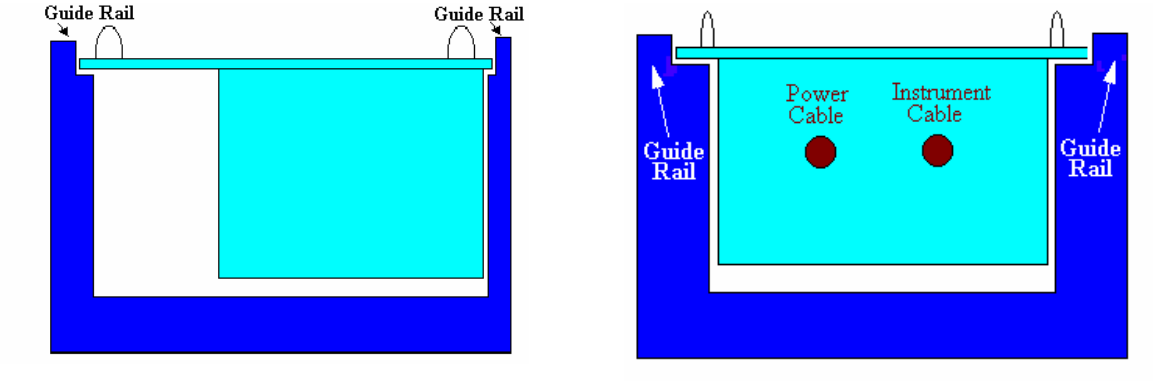

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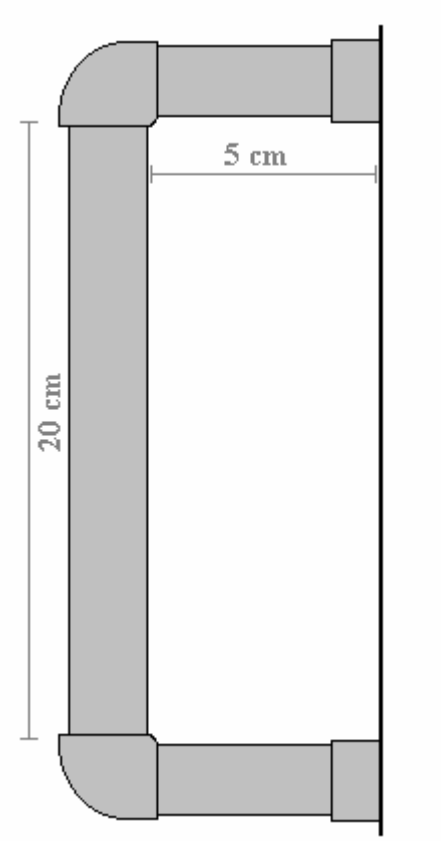

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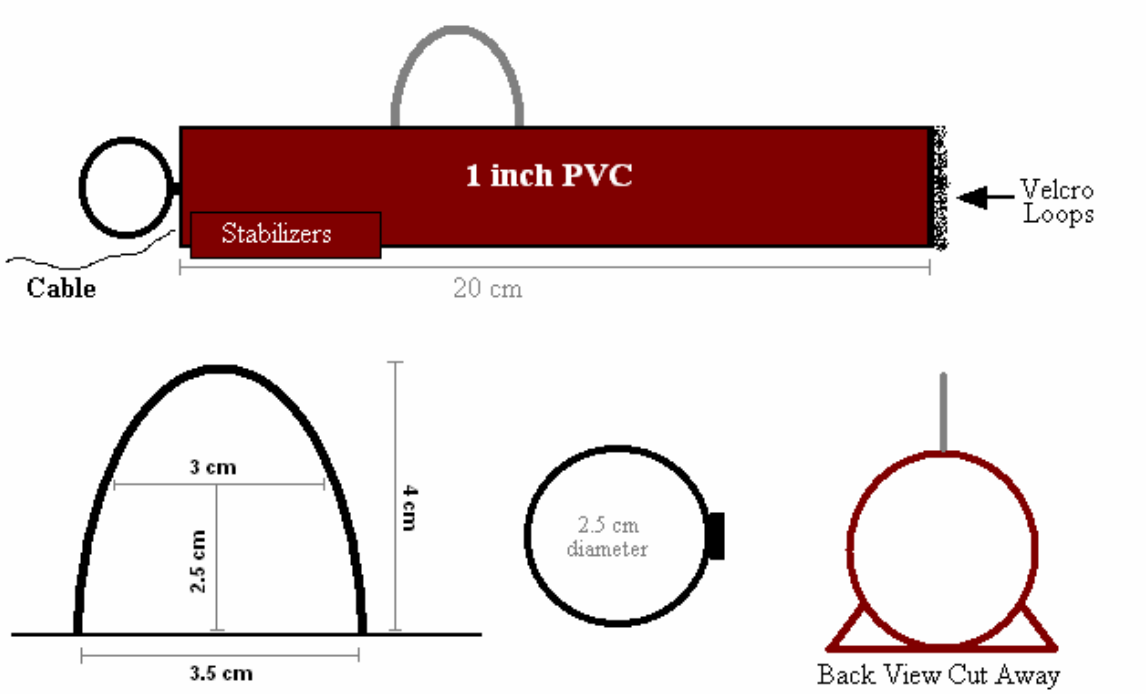

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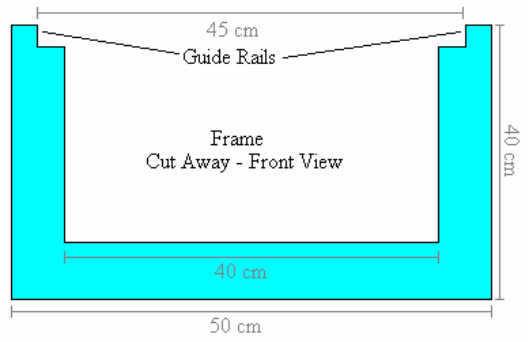

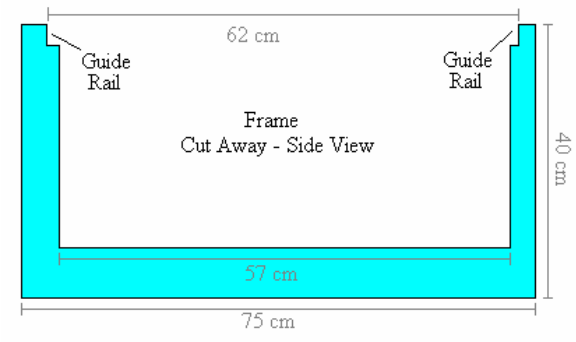

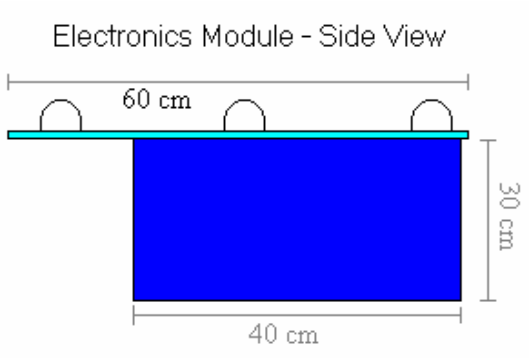

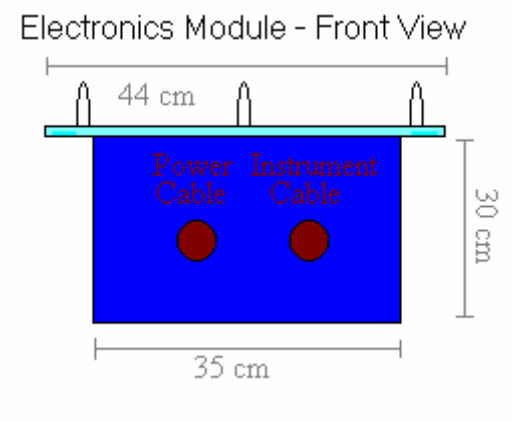

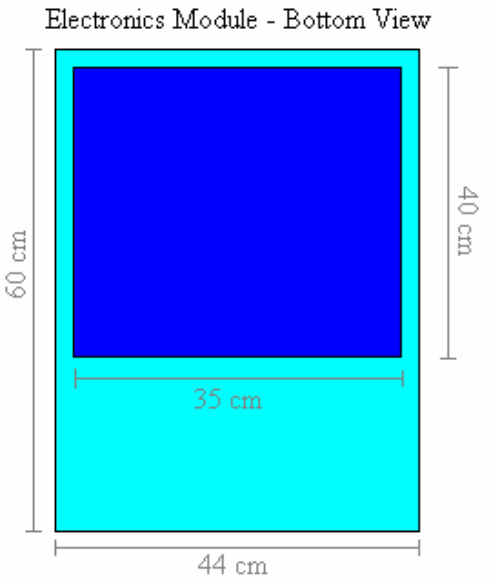

Mission #2: Trigger a malfunctioned acoustic release transponder to release an instrument package.

Teams must manually trigger the release to free the instrument package.

The instrument package will be constructed of 30cm length of 3-inch PVC with end caps on both ends. The instrument package will be buoyant and float above the work area. The acoustic release transponder unit will consist of a base, housing, and manual release. The manual release will be similar to a cotter pin. It will be a 15cm long metal wire with a 2.5cm loop on one end to facilitate removal. The release must be pulled horizontally from the housing in order to release an internal loop holding the instrument package in place. It will take less than 1N of force to pull the release from the housing.

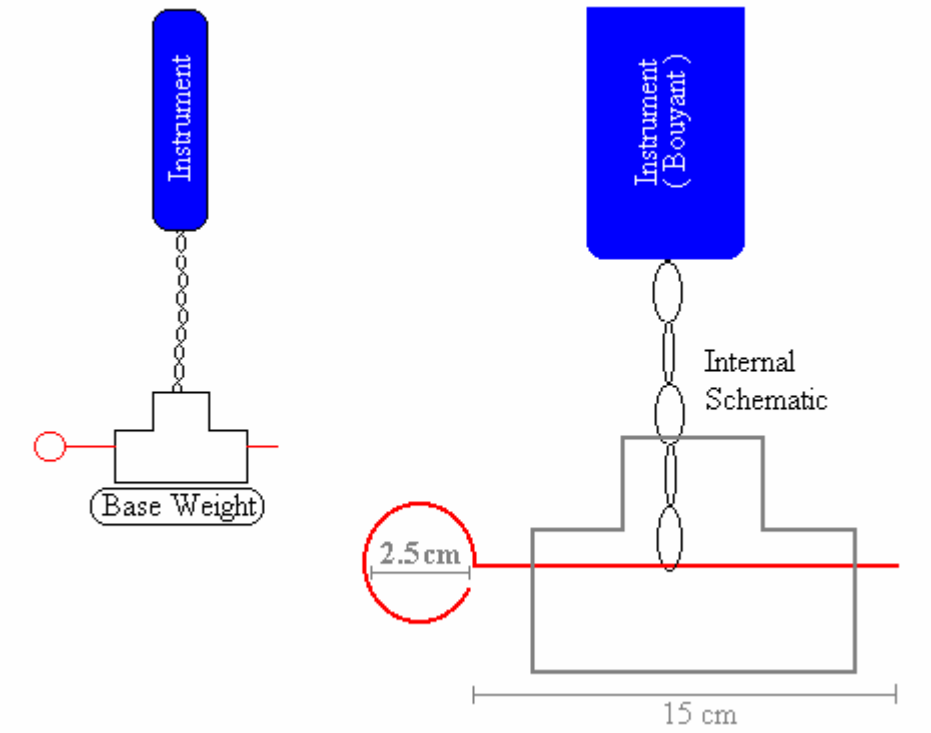

Figure #5: Diagram of the instrument package and internal view of the manual release pin.

The base of the acoustic transponder will be secured to an outcropping approximately 1m tall. The top of the outcropping will be 15cm square. The base of the acoustic transponder will be a dive weight. The weight will be attached to the acoustic transponder housing, which will be a ¾-inch PVC "tee." The manual release will enter the housing and travel through a link of a chain that is approximately 30cm long. The chain will attach to the positively buoyant instrument package floating above the acoustic transponder unit.

Removing the release will free the chain and allow the instrument package to float to the surface. The release may not need to be removed completely in order to free the

instrument package. The mission will be complete when the release is pulled out completely and/or the instrument package begins to float towards the surface.