Pool Courses – Overview & Rules

2022 International SeaPerch Challenge www.seaperch.org

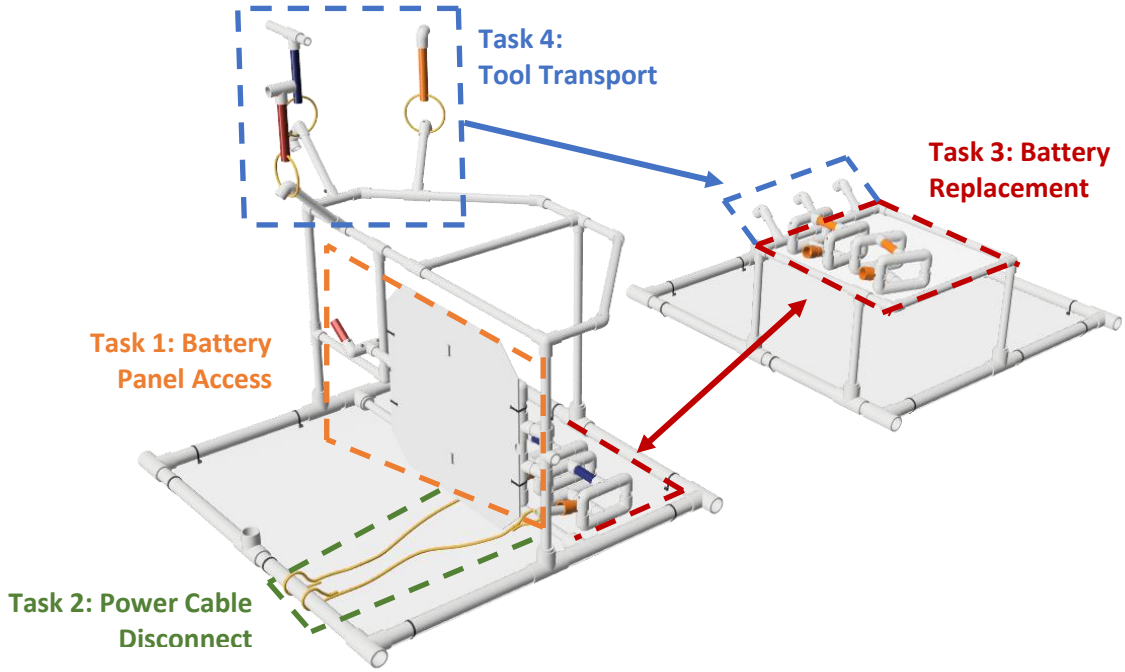
Pool Course Event Overview

This year's competition will include two in-pool components: an obstacle course and a mission course.

The Obstacle Course tests high-speed maneuverability and requires the SeaPerch ROV to navigate the course as quickly as possible.

The Mission Course incorporates a mission that teams must complete with their SeaPerch ROV related to Space Exploration. The *International Space Station (ISS) Extravehicular Activity (EVA) Mission* is a simulation of the tasks and environment that an ROV might encounter while assisting astronauts on an EVA outside the ISS. Teams will be tasked with upgrading the ISS's battery system and moving tools for astronauts. Specific tasks include:

1. *Battery Panel Access*: A latch must be rotated to gain access to the battery compartment.
2. *Power Cable Disconnect:* Power cables must be disconnected from batteries.
3. *Battery Replacement*: Used batteries must be replaced with new batteries. This includes:
    a. *Remove Used Batteries*: Move batteries from the Battery Compartment to the Battery Pallet
    b. *Position New Batteries*: Move batteries from the Battery Pallet to the Battery Compartment.
4. *Tool Transport*: Tools must be transported from the EVA Tool Tray to the Tool Caddy.



General Pool Event Rules

ROV, Spare Parts, and Adjustments

1. The team must use the same ROV that was presented at compliance for both pool events.
2. Each team must have their own ROV – teams are not allowed to share an ROV.
3. Teams are not allowed to share ROV attachments or devices.
4. Spare parts are allowed; however, spare ROVs are not allowed.
5. Any design or structural modifications made to the ROV must be made before the team's first pool event and the ROV must be re-submitted for a compliance check.
6. No parts or materials, except as noted in this section, may be added to or removed from the ROV between pool events. The ROV must compete in both pool events with the same attachments and parts connected. Violations will result in disqualification.
7. Attachments and parts may be repositioned between the two pool events.
8. The ROV may be worked on or adjusted during competition. This may include adjusting buoyancy, adding, or removing buoyancy materials, or adding materials like tape or cable ties necessary to secure parts. However, the run timer will continue.
9. Replacement of failed or damaged parts is permitted. Teams replacing failed or damaged parts must re-submit their ROV for a compliance check conducted by staff at the Triage or ROV Poolside First Aid Station.
10. Passing compliance checks does not guarantee the right to compete. Lead judges in the competition area have the final say on safety and compliance issues and may require teams that have already passed the compliance check to fix issues prior to competing.

Auxiliary Equipment, Batteries, and Power Supplies

1. 12-volt direct current (VDC) power connections for the standard SeaPerch power cable alligator clips will be supplied for each competition lane. This power connection is for the ROV only; no auxiliary equipment may be connected to this power connection.
2. Teams may provide their own battery for the ROV.
3. Teams may provide an additional battery for auxiliary equipment such as cameras, advanced controllers, and electromechanical ROV attachments.
4. Team supplied batteries must not be larger than 6.5" long x 3" wide x 4" high and must be 12 VDC with a maximum of 9-amp hour rating.
5. Teams may not bring anything to the pool deck that requires 110-volt power.

Diver Assistance and ROV Tether Handling

1. The ROV must move only under its own power. Teams will incur a two-minute penalty if they pull or otherwise maneuver the ROV by the tether.
2. If the ROV or tether becomes tangled on the course structure or is otherwise unable to move on its own power, a team member must notify the judge that they would like to try to free the ROV, or request diver assistance to free or retrieve the ROV. Under this circumstance teams may pull on the tether; however, the run timer will continue, and a two-minute penalty will be added to the elapsed time. If the ROV is pulled by the tether or moved by a diver, the ROV must be returned to the location that it was moved from before it may continue competing.

On Deck

1. A maximum of four (4) team members are allowed in the pool area. All four members must have a pool pass to enter the pool area. Only two (2) student team members (competing members) are allowed at the competition lane. The remaining student team members (non-competing members) must sit in the bleachers located behind the pool competition area

(referred to as staging 3 bleachers). Non-competing members are allowed to cheer for their team, but they are not allowed coach or instruct the competing members. Non-competing members are not allowed to communicate with the judges. Prior arrangements are required for waivers to these rules to accommodate special needs.

2. Once the pool event run starts the competing and non-competing members are not allowed to switch positions.
3. The competing team members may switch drivers at any time and as many times as they choose.
4. All team members must wear shoes with rubber soles while on the pool deck.
5. Teams will be given a two -minute set-up period after arriving at the competition lane. During this set-up period, teams should adjust the ROV's buoyancy and make any other necessary adjustments. The lane judges will start the run timer at the end of the set-up period even if the team is not ready. If the team experiences an equipment failure, they must notify the judge. The team will be allowed move away from the lane to make repairs and will be given an alternate time slot if time permits.

Pool Course Logistics

1. Each team will compete in the mission course as their first pool event and upon completion will immediately compete in the obstacle course.
2. Teams will be given 5 minutes to adjust their ROV before competing in the obstacle course.
3. Any combination of the team members may switch between the mission and obstacle course. This allows different drivers and tether handlers to compete in the two pool events.
4. If the team's ROV is not ready for the obstacle course in the allotted time the team will be allowed to work on their ROV at the ROV Poolside First Aid Station. See the *Equipment Failure* section for additional information.

Missed Pool Competition Scheduled Time

1. If a team cannot compete in the pool events at their scheduled time, they must notify a RoboNation staff member and be rescheduled.
2. Any team not showing up at their scheduled pool time and not notifying a RoboNation staff member will be disqualified from the pool events.

Equipment Failure

1. In the event of equipment failure between pool events, a team will be allowed to work on their ROV at the ROV Poolside First Aid Station.
    a. The ROV Poolside First Aid Station is intended for *quick repairs* that can be accomplished in 15 minutes or less. The Poolside First Aid station will not be equipped with electrical power, so soldering is not allowed.
    b. After successful repairs, the team will reenter the competition queue in the front of the line at the 2nd staging area.
    c. If repairs are not accomplished in the 15-minute time limit the team must proceed to the pool check-in station and notify the staff that they require Triage. Teams completing repairs in Triage will check-in at the pool check-in station and enter the 1st staging area.
2. While the RoboNation staff will attempt to accommodate all participants, teams not completing repairs by the last pool event time slots may not be able to compete.
3. If an ROV or equipment malfunctions while competing but before attempting the first mission task or passing the first obstacle course hoop the team may elect to stop their run without incurring a time penalty. The team will be allowed to attempt to make repairs as described in

item 1 of this section.

4. If an ROV or equipment malfunctions while competing but after attempting the first mission task or passing through the first obstacle course hoop the team may elect to stop their run. The judge will record the current run time and notify the lead judge. The lead judge or technical director will evaluate the issue and decide a course of action. If the team is allowed to make repairs and restart their run, they may incur a time penalty equal to their initial run time at the time they stopped their initial run.

Disputes, Challenges, and Redress Request

1. Sportsmanship is always expected.
2. Unsportsmanlike conduct is grounds for the disqualification of a team. Team members and advisors are responsible for the conduct of all members and adults accompanying the team.
3. Teams may not question the legality of other competing vehicles or other teams' scores.
4. Team members other than the two competing team members may not approach or speak to the lane judges, unless prior arrangements have been made to accommodate special needs.
5. Timing disputes such as a team member claiming the judge did not start or stop the stopwatch at the correct time are not allowable disputes. Team members will verify the time on the scoresheet reflects the time on the stopwatch. If the recorded time is not the same, then a team member may ask the lane judge for a second opinion.
6. Disputes should be resolved at the time the alleged grievance occurs. However, if students are not able to articulate the alleged grievance, they may ask to speak to the lead course judge. The lead course judge will provide a redress request card that will allow the student and adult team members to meet with the technical director or lead judge to resolve the dispute. *Decisions of the technical director or lead judge are final, and the same dispute will not be heard again.*
7. If an ROV or the course is inadvertently interfered with during the competition the competing team members should alert the lane judge and ask for a ruling by the lead judge or technical director. These situations will be addressed on a case-by-case basis.
8. Team members or spectators may not speak to the divers or support personnel.

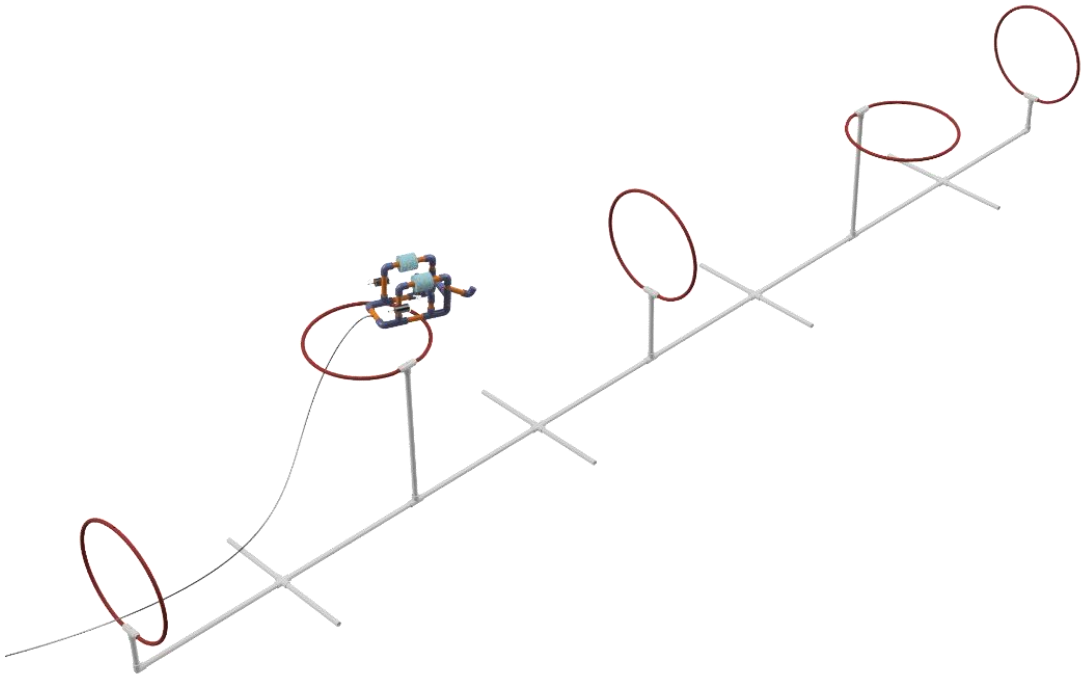
Obstacle Course Task Description & Preliminary Rules

The Obstacle Course consists of five 18" hoops oriented at different angles. Please note there is no guarantee of the position of the obstacle course hoops at competitions, so operators should not try to memorize actions such as in playing a video game but should instead practice a variety of general high-speed maneuvers. Time allotted for the obstacle course run is dependent on venue, number of teams, and other factors and will be released with final rules.

Obstacle Course Navigation & Rules:

1. *Start of run*: The ROV must be surfaced, within six inches (6") of the wall, and under its own power. Team members are not allowed to touch the ROV after the lane judge begins the countdown to start the run.
2. The ROV is required to pass through each of the five obstacle course hoops in order starting at the hoop closest to the pool wall.
3. The ROV must surface after clearing the hoop furthest from the pool wall. Surfacing is considered complete when any part of the ROV breaks the surface of the water.
4. The ROV must re-submerge and head back to the pool wall by passing through each of the five hoops in reverse order.

5. *End of run:* The run is complete when the ROV touches the pool wall while surfaced (any part of the ROV breaks the surface of the water). The run will be aborted if the allotted time expires even if the ROV has not completed the course.



Mission Course Task Description & Preliminary Rules

The Mission Course consists of four tasks across two task frames. Tasks may be completed in any order with the exceptions noted in individual tasks.

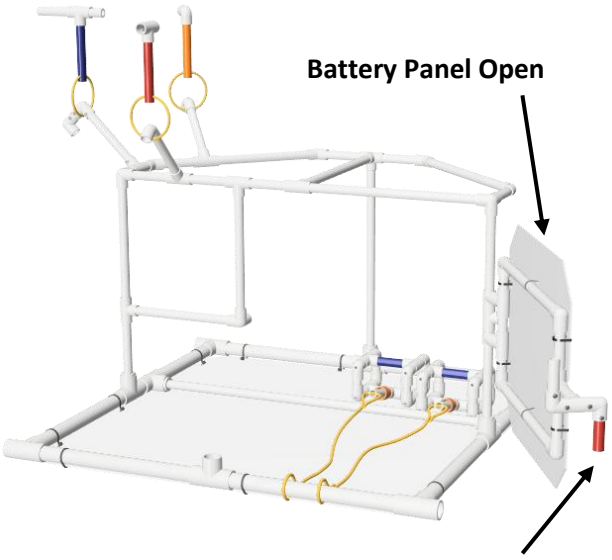
Mission Course Navigation & Rules:

1. *Start of run:* The ROV must be surfaced, within six inches (6") of the wall, and under its own power. Team members are not allowed to touch the ROV after the lane judge begins the countdown to start the run.
2. Batteries and tools may be transported in any order.
3. Multiple batteries and tools may be transported at the same time.
4. Once a used battery has been removed from the battery compartment (Task 3), points will not be awarded for opening the battery panel (Task 1).
5. Points will not be awarded for disconnecting power cables (Task 2) if the disconnection occurs due to used batteries picked up, pushed, or moved by other means. Points are only awarded if the power cable is pulled or pushed to disconnect them from the batteries.
6. Points will not be awarded for multiple tools left on a single hook in the tool caddy (Task 4).
7. Objects falling past the task frame are out of play and the ROV is not allowed to attempt to retrieve them.
8. Tools that float out of the team's competition lane are out of play and may not attempt to retrieve them.
9. *End of Run:* The timer will be stopped when the ROV touches the pool wall while surfaced (any part of the ROV breaks the surface of the water). Teams will receive points for all tasks completed during the run and bonus points will be awarded to teams to complete their run prior to the maximum allotted time.

Time allotted for the mission course run is dependent on venue, number of teams, and other factors and will be released with final rules.

Task 1: Battery Panel Access

This task includes two subtasks: 1) unlatching the panel and 2) opening the panel to gain access to the batteries.

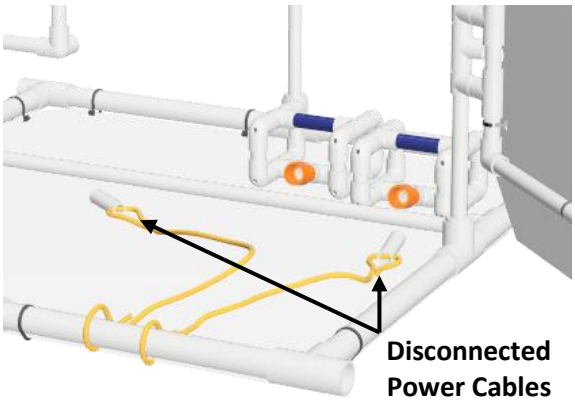


To unlatch the panel, the latch must be rotated counterclockwise approximately 120° to unlatch the battery panel. The panel will not open automatically upon unlatching. The battery panel must be pulled or pushed to any position that will allow the batteries to be retrieved.

If a team is unable to open the battery panel, they may request diver assistance to open it, but a time penalty will be assessed, and points will not be awarded for Task 1. If the team fails to open the battery panel, they may still transport the batteries as described in Task 3.

Task 2: Disconnect Power Cables

This task requires teams to disconnect the power cables that are magnetically connected to batteries located in the battery compartment behind the battery panel.



The power cables are magnetically connected to the batteries and require minimal force to unplug. To receive points for disconnecting the power cables force must be applied to the cables, not the batteries.

Task 3: Battery Replacement

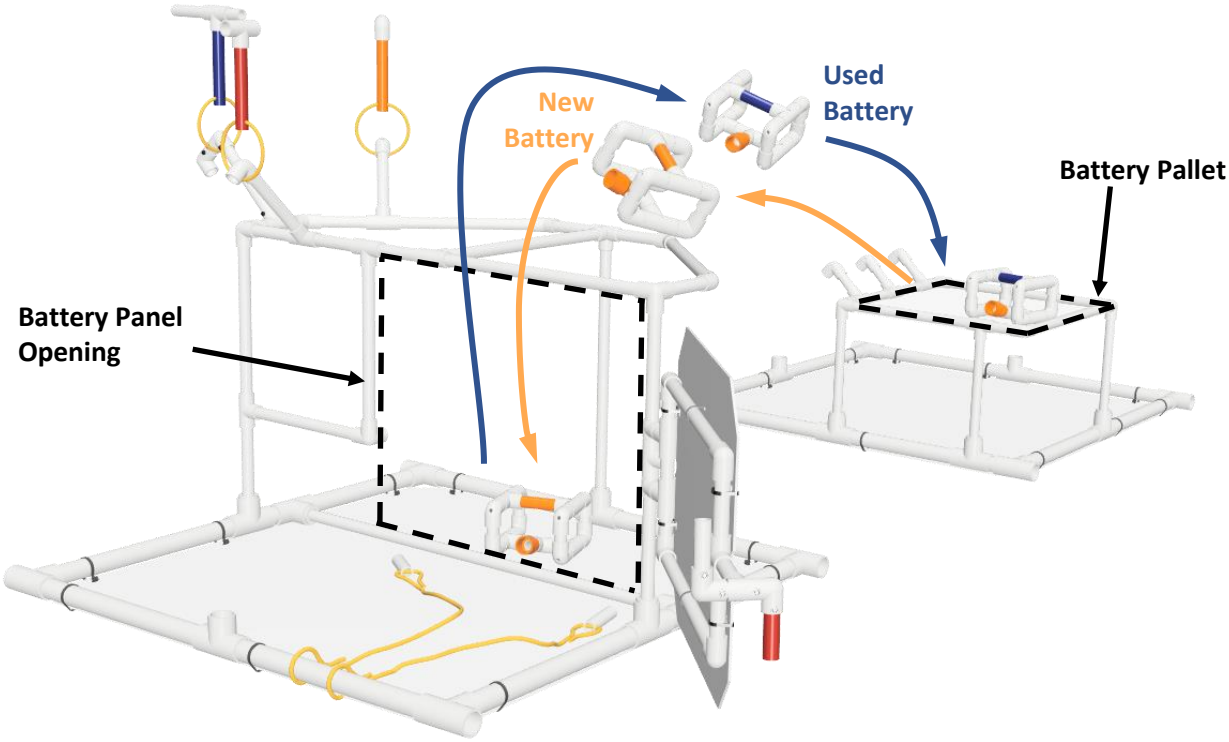
This task includes two subtasks 1) moving used batteries from the battery compartment to the battery pallet and 2) moving new batteries from the battery pallet to the battery compartment.

If the team fails to open the battery panel (Task 1), they may still transport the batteries by going down through the top of the battery compartment structure, retrieving the batteries and exiting through the top of the battery compartment structure.

Points will be awarded when an old battery are placed on the battery pallet when the ROV disengages from the battery. Points will not be deducted if a battery that was previously placed on the battery pallet is knocked off or falls off. If a battery falls off the battery pallet while the ROV is attempting to disengage from the battery the ROV make retrieve the battery if it does not fall passed the task frame.

Points will be awarded when a new battery is placed inside the battery compartment (battery panel opening) when the ROV disengages from the battery. Points will not be deducted if a battery that was

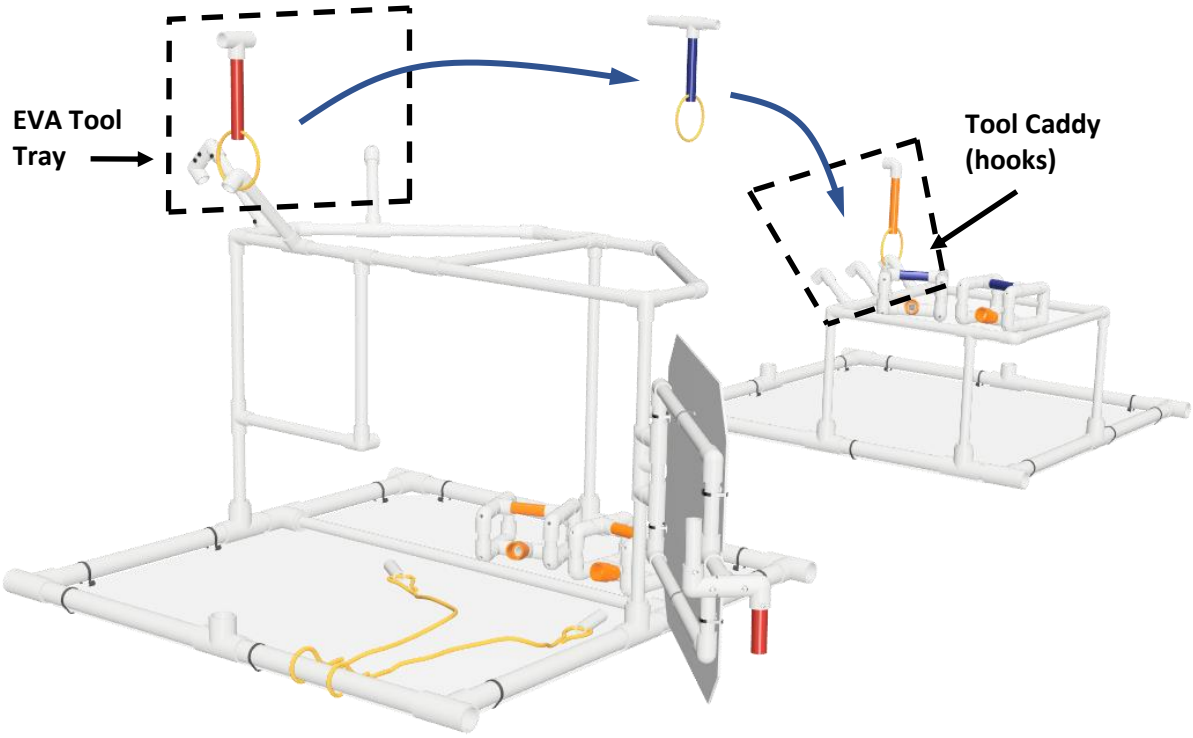
previously placed on inside the battery compartment is knocked off or falls off.



Task 4: Tool Transport
This task requires teams to move three (3) tools from the EVA tool tray on the front task frame to the tool caddy on the back task frame. The tools are slightly positively buoyant and may float away during transport.

Tools may be transported in any order and may be placed on any open hook on the tool caddy. Multiple tolls may be transported at the same time. Only one tool may be placed on each hook.

Points will be awarded when a tool is placed on a hook on the tool caddy when the ROV disengages. The ROV must completely disengage, and the tool must stay on the hook while the ROV moves away. Points will not be deducted if a tool that was previously placed on a hook is knocked off or falls off.


EVA Tool
Tray
Tool Caddy
(hooks)