Spanish Galleon Handbook

The following document contains information on Spanish galleons that were lost in the region. The important information included is the **name** of the ship, the **date** of construction, which is printed on all cannons, and the **home port** of the ship, which is printed on the dining platters. Additional information includes the number of cannons included when the galleon was outfitted and any information known about the loss or sinking of the galleon.

Atlantica: The Atlantica was constructed and armed with 56 cannons in **1709**. She sailed from the port of **Bilbao** on the north coast of Spain. The Atlantica was lost in a hurricane in 1717, only eight years after construction.

Balanus: The Balanus was constructed and armed with 63 cannons in **1742**. She sailed from the port of **Cartegena** on the east coast of Spain. The Balanus was damaged in a skirmish with privateers and scuttled by her crew in 1759.

Corazon del Mundo The Corazon del Mundo was constructed and armed with 50 cannons in **1683**. She sailed from the port of **Bilbao** on the north coast of Spain. The ship set out from Spain in 1704 and was never seen again.

Domingo: The Domingo was constructed and armed with 48 cannons in **1683**. She sailed from the port of **Cadiz** on the southwest coast of Spain. In 1703, the Domingo was sunk by British warships.

Esmerelda: The Esmerelda was constructed and armed with 66 cannons in **1742**. She sailed from the port of **Bilbao** on the north coast of Spain. The Esmerlda was caught in a hurricane and sank in 1760.

Ferdinando: The Ferdinando was constructed and armed with 56 cannons in **1709**. She sailed from the port of **Cartegena** on the east coast of Spain. The Ferdinando, full of gold and silver bullion, left from Mexico in June of 1725 and never heard from again.

Galcia: The Galcia was constructed and armed with 70 cannons in **1742**. She sailed from the port of **Cadiz** on the southwest coast of Spain. The Galcia was damaged by pirates and unable to keep up with the Spanish fleet. She was scuttled by her crew in 1751.

Hecheco: The Hecheco was constructed and armed with 50 cannons in **1683**. She sailed from the port of **Cartegena** on the east coast of Spain. The Hecheco went down after two hurricanes battered her in 1697.

Isabella: The Isabella was constructed and armed with 56 cannons in **1709**. She sailed from the port of **Cadiz** on the southwest of coast Spain. The Isabella went missing in 1735.

Mission equipment:

The MATE Spanish Galleon Mission equipment can be purchased through the SeaMATE Store.

Corals (3):
Corals are constructed from pipe cleaners set into a PVC tee base. The branches of the coral may need to be spread out after storage. Three corals are included.

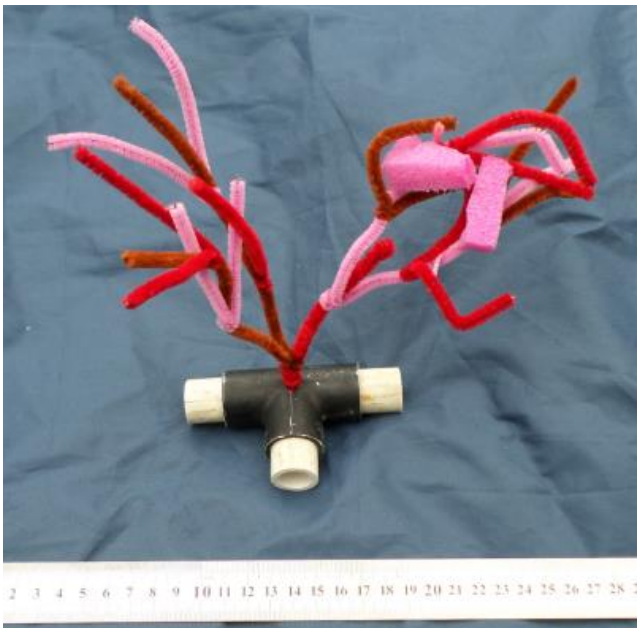


Photo #1: A coral.

Designated area (1):
The designated area is constructed from ½-inch PVC. One designated area is included. All three corals should be placed within the one designated area.

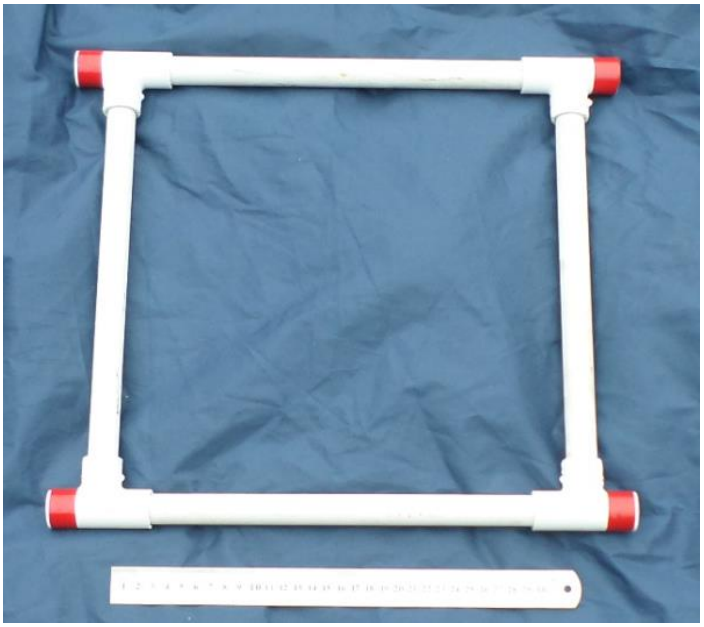


Photo #2: Designated area.

Urchin (2):
The urchins are simulated by an O-ball. A 90° elbow is inserted into the O-ball to lessen rolling. Two urchins are included.

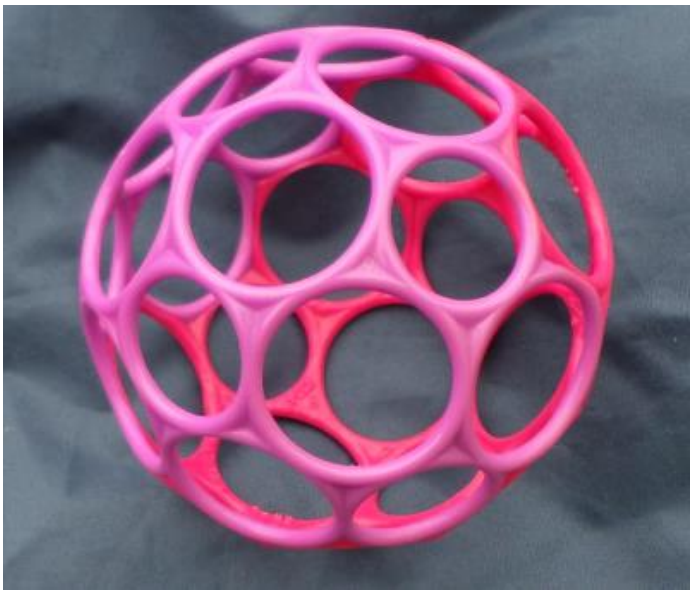


Photo #3: Urchin. Note: The color of the urchin may be different.

Cannon (1):
The cannon is constructed of 1 ½-inch PVC pipe with a U-bolt grab point. The build date of the galleon is attached to the cannon in 2-inch, black on white numbering. One cannon is included.

Photo #4: Cannon with grab point.

Platter (1):
The platter is constructed from ½-inch PVC pipe and a 2-gallon bucket lid. The home port of the galleon is attached to the platter in 2-inch, black on white lettering. One platter is included.

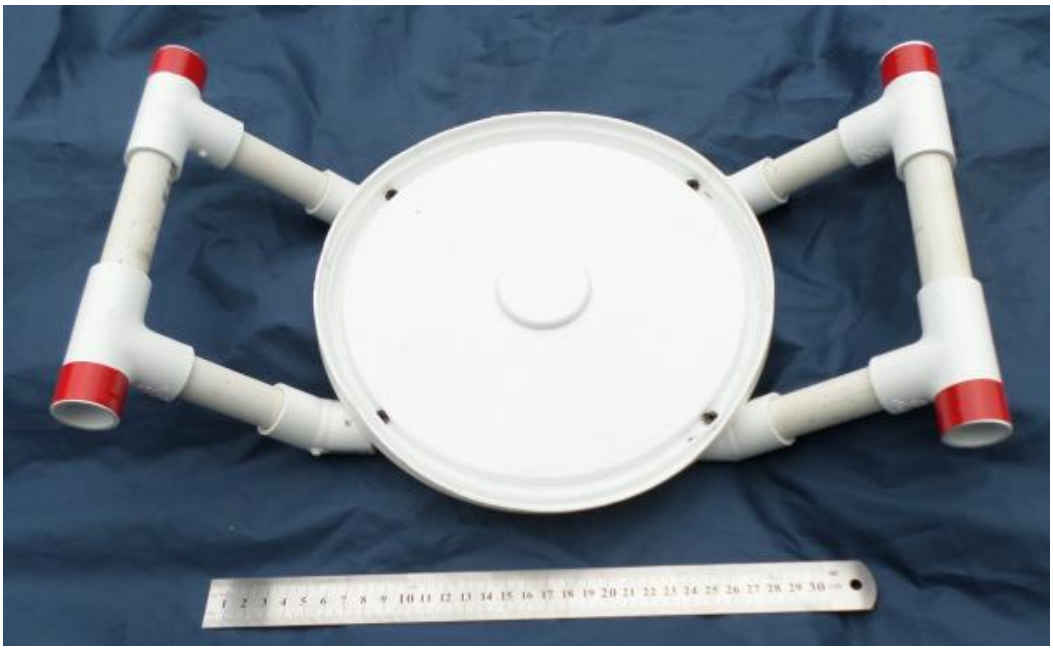


Photo #5: Platter

Aluminum cans (4):
The aluminum cans are simulated by 1 ¼-inch PVC couplings. Two set screws have been inserted into the coupling to reduce rolling of the coupling. Four aluminum cans are included.

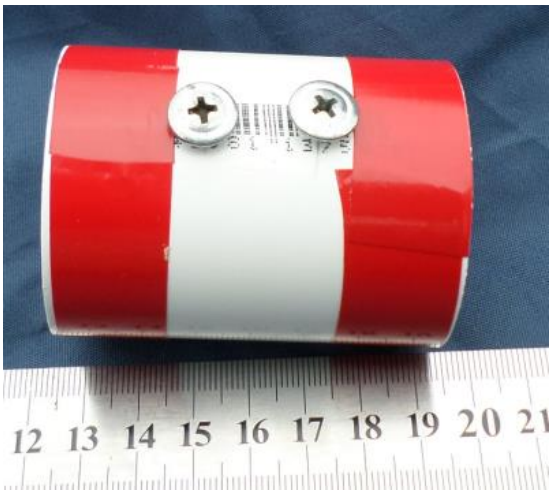
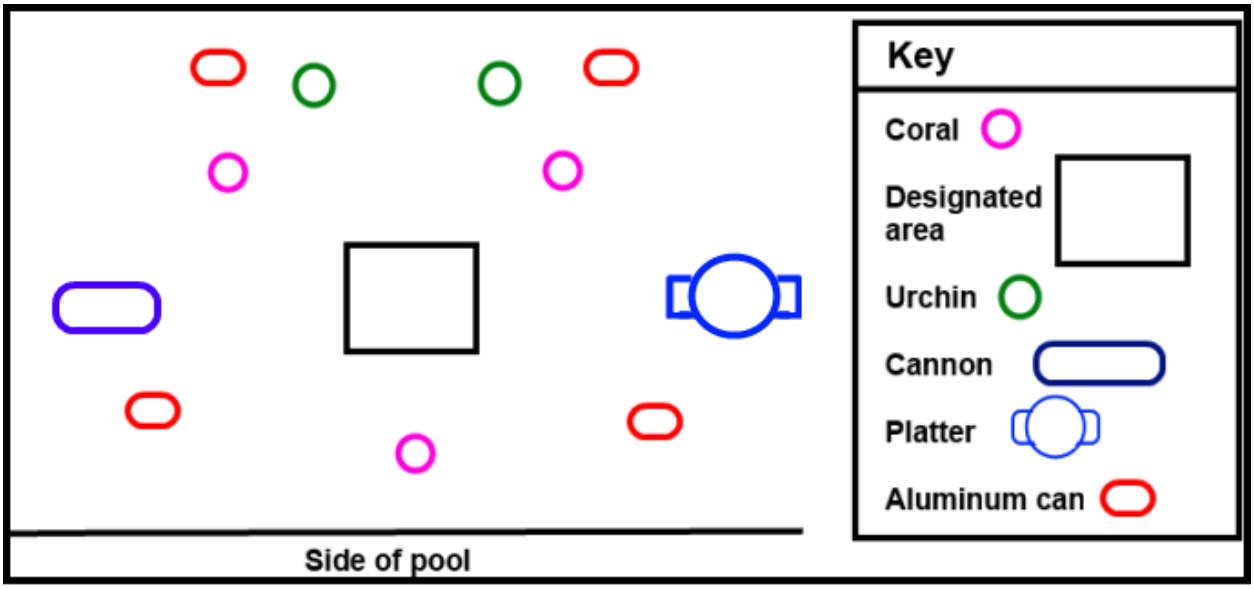


Photo #6: Simulated aluminum can.

Underwater set up

All items (corals, urchins, cannon, platter, aluminum cans and the designated area for corals) should be placed between 1 and 4 meters from the side of the pool where the ROV is launched. All corals should be at least 1 meter from the designated area for corals. The following is one possibility for setting up the mission in the pool.



ROV specifications and rules

Tether length:

All mission items will be located within 4 meters of the side of the pool. Teams should also take into account the depth of the pool when calculating how much tether the vehicle needs.

Propellers:

To prevent injury to fingers and the pool, all propellers should be completely inside the frame of the vehicle or shrouded.

Electrical:

The ROV will be powered off a 12 volt power source. The maximum amperage allowed is 15 amps. For safety purposes, no batteries are allowed on the vehicle. No batteries should go in the water.

All ROVs must be fused with a 15-amp (or smaller) fuse. No exceptions.

Fluid power:

Fluid power is allowed. Fluid power is hydraulic pumps (water) or pneumatic pumps (air) on the vehicle or on the surface.

Electric pumps of any sort are not allowed. Teams may only use manual pumps (hand or foot pumps) to push fluids down the tether and to their vehicle. Manual bike pumps and plastic syringes are acceptable fluid power systems. Only water may be used as a hydraulic fluid. Only air may be used as a pneumatic fluid.

If air is pumped into a container on the vehicle, that container must be open to the water. Vent holes on the container must be at least ¼-inch (6.35 mm) in diameter.

For example: A company wants to fill a PVC pipe container on the vehicle with air. Companies may only use a manual pump (hand/foot powered bicycle pump) to push air down to the vehicle. The company drills four ¼-inch holes in the bottom of the pipe. As they pump air into the container, it will displace the water out of the holes in the bottom of the pipe. However, the pressure inside the container can never get above the ambient pool pressure; excess air will come out the holes on the bottom of the pipe once all the water has been displaced.

Pulling on tether:

Pulling on the tether to move or steer your ROV is not allowed. The ROV must be driven with the ROV control system. A 5-point penalty may be assessed to your team if you pull on the tether to move or position the ROV.

Safety first!

Safety is key to operating any vehicle in the water. Be safe when constructing and operating the vehicle. If the water your ROV is operating in is deep, rough or unfamiliar, or if you cannot swim, consider wearing a personal flotation device (life jacket). Wear close-toed shoes and safety goggles when constructing your vehicle. Tie back long hair or loose clothing when operating any power tools during construction. Have a safe and fun time constructing and operating the ROV.

Engineering & Communication

Along with building and operating your ROV to complete the underwater tasks, you may be required to do a written report on your vehicle, an oral presentation on your vehicle, and a poster to showcase the abilities of your ROV.

Your instructor will tell you which, if any, of the Engineering and Communication components you are required to complete.

Written technical documentation:

- Describe all the components of the vehicle (motors, control system, tether, buoyancy, gripper/manipulator, etc.) and how you built or modified them.
- Consider using photos of the vehicle and its components when explaining how you built your vehicle. Remember to label each photo with a caption. If you do use photos, include a completed photo of the vehicle.

- Describe any challenges that you had to overcome to build your ROV. There could be multiple challenges encountered for the various systems. These challenges could be either technical (difficulties in constructing the components) or personal (working with a team of other students).
- Describe any lessons learned or skills gained by building your ROV. Reflect on your experience of building the ROV and what your feel are your accomplishments.
- Make sure to reference any books, websites or other sources you used to help you construct your ROV. Make sure to acknowledge any sponsors or other help you had in building your ROV.
- Highlight any safety features of the vehicle.

Spec sheet

Oral engineering presentation:

- Describe all the components of the vehicle (motors, control system, tether, buoyancy, gripper/manipulator, etc.) and how you built and modified them. Every team member should talk about at least one component of the vehicle that they worked on.
- Talk about the challenges you and your team faced in constructing the ROV. Focus on how you overcame the challenges to create a functional working vehicle.
- Be concise. You will likely have much more to say about your vehicle than the time you have for this presentation. Think about what the key aspects were that you worked on.
- Be prepared to answer general questions about your vehicle and its operations. Every team member should know the basics about every component of the ROV. If more detailed questions are asked, pass the question on to the team member that specialized in that system.
- Highlight any safety features of the vehicle.

Poster Display:

- A poster is designed to communicate to someone who may not have any technical knowledge or background about ROVs or how they are used. They may not have an understanding of the technology you used, but are still interested in your vehicle. Design your poster display to communicate to this audience.
- Include a caption with each picture. Include a picture of the complete vehicle.
- Choose a font size that can be easily read from 1.5 meters away. Stick with the font you choose throughout the poster display.
- Include a section on the “Features & Benefits” of your ROV. What makes your vehicle stand out and why did you make the choices you did for the feature.
- Highlight any safety features of the vehicle.