



Submarine Survival The Game

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Section 2 – The Game

2.1 – Overview

This section describes the CREATE Junior game called *Submarine Survival*. It also lists the game definitions and game rules.

2.2 – Game Description and Field Drawings

Matches are played on a field initially set up as illustrated in the figure below. Two teams, making up an Alliance, collaborate in each match. The object of the game is to attain the highest score possible by working together to separate water into hydrogen (golf balls) and oxygen (pit balls) and then position, push, and place them in their respective goals. Oxygen atoms (pit balls) are to be pushed or placed into one of two oxygen holding tanks (white rectangular goals). Hydrogen atoms (golf balls) are to be removed from the submarine via the 4 triangular exhaust ports (corner goals). Points can also be gained by launching the research diving bell (large ball), raising the periscope, and by parking your robot at the end of the match on the periscope pad.

There are a total of twenty-eight (28) Hydrogen Atoms, fourteen (14) Oxygen Atoms, one (1) Research Diving Bell and one (1) Periscope. Points are awarded for raising the periscope, storing oxygen atoms in the oxygen holding tanks, removing the hydrogen atoms from the submarine via the 4 triangular exhaust ports, launching the Diving Bell and by touching any part of the periscope at end of the match.



2.3 – Game Definitions

Alliance – Two randomly paired teams that work together during a match.

Coach - A student or adult designated as the team advisor during the tournament.

Diving Bell – The large colored ball located in the center of the field.

Driver - A team member responsible for operating and controlling the Robot. Only the two drivers from a team are allowed to be in the Driver's Station during a match.

Driver Change – Changing from the first to the second driver in the middle of the match. The change must occur between :30 and :60 seconds.

Driver's Station – The designated region where the drivers stand during any match.

False Start – A robot moving before the match begins will be considered to have false started. A five (5) point penalty will be assessed for each robot that false starts. If the false start is severe, at the discretion of the referee, the robot may be disqualified.

Hydrogen Exhaust Vent – Any one of four black corner goals used to exhaust (score) hydrogen atoms (golf balls).

Match - A one minute and thirty second driver controlled period. A match starts when the referee says "Go".

Match Loads – Any one of eight water molecules. Water molecules are made up of (2 hydrogen atoms (golf balls) and one oxygen atom (pit ball)). Four match loads are available to each team. Match loads start outside the submarine, 4 molecules by each team, and are introduced by team members during the match.

Oxygen Tank – One of two black and white rectangular/square goals used to store (score) oxygen atoms (pit balls).

Parked – A robot is considered to be parked when it is in contact with the any part of the Periscope.

Periscope – PVC assembly located in the middle of the submarine (field).

Pre-loads of Water Molecules - Any one of four water molecules (8 hydrogen atoms (golf balls) and 4 oxygen atom (pit balls)). Two pre-loads are available to each alliance partner. Legally loaded pre-loads must touch the robot and cannot touch the field tile or any game object. Pre-loads must be loaded as a complete molecule and any pre-load that is not used will be removed from the field for that match.

Pre-placement of Robots – Each team is allowed to place their robot in the submarine (field) so long as the robots are on same side of the submarine and at least one wheel of the robot is touching the hydrogen exhaust vent (corner goal).

Removed from the field – Any game object that leaves the field stays out the duration of the match.

Robot – Anything (which has passed inspection) a team places on the field prior to the start of a match.

Scored –

- A hydrogen atom (golf ball) is considered scored if the majority of the atom is inside any corner goal. Stacking in the corner goals is legal.
- An oxygen atom (pit ball) is considered scored if the majority of the atom is inside one of the two

oxygen tanks (rectangular/square black and white goals).

- For the short rectangular oxygen tank the oxygen atoms must be touching the floor of the tank, stacking is NOT allowed and the number of oxygen atoms in this tank is limited to eight. To fill this tank with more than 8 atoms would exceed its pressure rating and will not be scored.
- If the periscope is in the raised position at the end of the match it is considered scored.
- Any robot touching any part of the periscope at the end of the match is considered scored.
- The Diving Bell is launched by pushing/placing it out either side of the submarine or out the bottom of the submarine. (The bottom of the sub is the long side closest to the drivers.)

Team Member – Any of the participants that make up the team. Team members may assist the drivers with the pre-placement of the robot, pre-loads and match loads. Only the two drivers (per team) are allowed in the Driver's Station for the match.

Water Pipe – The butterfly shaped plastic piece inside the water reservoir with three holes specifically designed to hold one water molecule.

Water Reservoir – Any one of 2 white water droplet shaped flat plastic pieces in the submarine. The water reservoir is considered to be the entire water droplet.

2.4 – Game Rules

2.4.1 – Scoring

- A hydrogen atom is scored if the majority of its mass is within the borders of a hydrogen exhaust vent.
 - Hydrogen Atom Scored - one (1) point
- An oxygen atom is scored if the majority of its mass is within the borders of an oxygen tank.
 - Short Rectangular Tank - one (1) point
 - Stacking in this goal is not allowed
 - Tall Square Tank - two (2) points
 - Stacking is allowed in this goal and the sides of the goal are considered to extend infinitely above its base.
- The Periscope is scored if it is in the upright position at the end of the match.
 - Raised Periscope - 15 (fifteen) points
- An "observation" bonus is awarded to robots touching any part of the periscope at the end of the match.
 - First robot touching - 5 points
 - Second robot touching - Additional 10 points for a maximum of 15 point observation bonus.
- A water molecule is scored for each set of two hydrogen atoms and one oxygen atom scored. This is in addition to their individual scores.
 - Each water molecule scored - 10 points.
- The Diving Bell is scored if it is pushed or placed outside the submarine on either side or out the bottom (long side closest to the drivers) of the submarine. - 10 points.
- If a robot false starts, a five (5) point penalty will be assessed. The match continues and is NOT restarted. If the false start is severe, by the judgment of the referee, a robot may be disqualified.

2.4.2 – Safety Rules

<S1> If at any time the *robot* operation is deemed unsafe or has damaged the playing field, surface, barriers or wall, by the determination of the referees, the offending team may be disqualified. The *robot* will require re-inspection before it may take the field again.

<S2> If a robot gets hung up on the perimeter or drives out of the field, teams MAY place the controller on the ground. The **driver** may slowly walk around the field to the stranded robot to place it back into the field. The robot should be placed just inside the point that it got stuck and should follow the guidelines below. The driver may then walk back to the driver's station and pick up the controller to continue as before. If teams are not performing this action safely, the Alliance may be disqualified at the discretion of the referee.

- a. The robot should be placed in the field as near to where it became caught on the side rail as possible.
- b. The robot cannot be touching any robot or any game elements that were not already captured by the robot at the time of getting stuck. An object is captured if the robot can be lifted straight up and the object stays with the robot.

<S3> If a *robot* goes completely out-of-bounds (outside the playing field) and continues to move, clear intent of returning to the field MUST be demonstrated. If a robot is being driven with any other intent, the robot/Alliance may be disqualified or stopped and the match ended at the discretion of the referee. A robot may not re-enter the field in a scoring position.

2.4.3 – General Game Rules

<G1> At the beginning of a match, each *robot* must not exceed a volume of 14 inches wide by 14 inches long by 14 inches tall. An offending *robot* will be removed from the *match* at the Head Referee's discretion.

- a. Alignment devices (templates, tape measures, lasers, etc.) that are not part of the *robot* may NOT be used to assist with the positioning of the *robot*.

<G2> For each match, teams shall include two *drivers*. The *drivers* may change from match to match.

<G3> During a *match*, the *drivers* are the only people allowed in the drivers station.

<G4> **Any** team member may assist in Pre-placement of the robot, pre-loads and match loads. Match loads must be done by the non-driver.

<G5> Scoring objects that leave the playing field are considered out of play. They will not be returned to the field for that match.

<G6> *Drivers* are prohibited from making intentional contact with any game or field object. The first instance of intentional contact will result in a warning, with any following instances resulting in disqualification.

<G7> During a *match*, *robots* may be remotely operated only by the *drivers*.

<G8> *Robots* may not intentionally detach parts during any *match*, or leave mechanisms on the field. Multiple infractions may result in disqualification for the entire competition.

<G9> *Robots* must be designed to permit easy removal of scoring objects from any grasping mechanism without requiring that the *robot* have power after the *match*.

<G10> Field tolerances may vary by as much as +/-1". Teams must design their *robots* accordingly.

<G11> At the discretion of the event partner the lowest score from each team may be dropped in determining final standings.

2.4.4 – Submarine Survival Specific Game Rules

<SG1> At the beginning of each *match*, the *robot* must be placed such that they are inside the submarine, are on the same end (short end of playing field) and at least one wheel must be touching a hydrogen exhaust vent.

<SG2> While the first driver is driving water molecules may be placed on the water pipe by the non-driver of the team. A team may only fill the pipe in the water reservoir directly in front of their driver station. They may NOT place water molecules in the water pipe of the water reservoir in front of their alliance partner. They may NOT hand their alliance partner match loads. Match loads placed in the water pipe must be done so that both hydrogen atoms and the oxygen atom are positioned in the hole designed for them and the atoms do not move after being placed. Water molecules can only be placed onto pipes of water reservoirs that have NO atoms within them.

<SG3> *Drivers* must change (*Driver change*) sometime between 30 and 60 seconds of the *match*. *Driver* one may hand the remote to *driver* two anytime between 31 and 59 seconds on the clock. If a team exchanges the remote too early or too late in a *match* the robot may be disqualified for that *match* at the discretion of the referee. If the remote is exchanged significantly outside of the designated time, the referee may disqualify the *alliance*, which will receive a zero score for that *match*.

<SG4> Teams may “flood” the water reservoir immediately after the driver change. Flooding the reservoir consists of placing as many water molecules (must be complete molecules) in the reservoir as possible. A team may ONLY flood the reservoir directly in front of their driver station. All atoms must be contained within the reservoir and cannot “flow” out of the reservoir when released. Only non-drivers may flood the reservoirs.

<SG5> The periscope may only be raised via the short end of the periscope. A team may not intentionally touch the long end of the periscope. Any team touching the long end of the periscope will be warned. If the robot continues to touch/push the long end of the periscope and it is deemed intentional by the referee, the referee at their discretion may disqualify that team.