Welcome to Space Arena

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This game is a recreation of an old Play-By-Mail game from 1991. In this game teams of space ships battle each other in a 2D arena. The game is a simulation where players all send in their orders before a round is processed. A round consists of 10 clock *ticks* and the results of the players' commands gets processed into a result output (HTML & PDF). Each ship receives their own result based on what they observed. This information is used to plan the next round and send in new orders, and the cycle continues until there is a winner.

Game rounds

The game is played in rounds of 10 ticks. Each round you send in a set of commands for that round. When the round is processed, all ships move and act according to their commands. The results of the round are then sent back to each ship's player and the cycle continues until the end conditions are reached.

Scoring

Event	**Score**
Damage shield	0.5 point per point of shield damaged
Break shield (to 0 strength)	25 points
Damage hull	2 points per point of hull damaged
Deal killing blow to other ship (0 hull)	100 points

Commands

You send commands in a .txt file. Enter one command per line, with the format `(tick number): (command)`. **You can write multiple commands per tick**, but they each should be on their own line. Whitespace in the commands does not matter: you can write R 90 or R90, whatever is your preference.

The following commands let the ship accelerate by 25 and turn 90 degrees left on tick 1, and fire a rocket from the launcher called 'L1' 90 degrees from its current heading on tick 2. Note that the A25 line is after the L90 line: the acceleration will always be processed before the turn in that tick.

```
1: L90
1: A25
2: Fire L1 90
```

Commands are for changes: you do not have to enter a command for every tick. If given no commands, your ship will fly straight at its current speed.

It does not matter in which order you put these lines, and it also does not matter if the tick numbers of the lines are out of order. All orders get processed in tick number order, and within a tick orders get processed in a specific order. Empty lines and lines starting with '#' are ignored. You can use this for instance to group your movement and weapon commands together.

You can fire each weapon once per tick, and they might have temperature or ammo to take into account. If you multiple commands to fire a specific weapon in the same tick, only the first command is executed. In this case line order does matter.

Command	Parameter(s)	Example	Purpose	Timing	Notes
A	+/- Integer	`A-30`	Increase or decrease speed in units per tick	One per tick, pre-move, before turn command	Limited to maximum acceleration, can be negative.
R / L / H	+/- degrees	`L45`	Turn right or left in degrees	One per tick, pre-move, after acceleration command	Limited to maximum turn rate per tick. However, at speed 0 there is no limit to turn rate.
F / Fire	[Weapon Name] [target or direction]	`Fire L1 MasterBlaster F M1 90`	Fire a named weapon. Depending on the weapon the next parameter is a direction (e.g. rockets) or the name of another object (e.g. Laser)	Post-move	Can fire each weapon once per tick
Replenish	No parameters	`Replenish`	Replenish the ship (ammo, hull, shields, temperature, etc.) when close to a star base.	Post-move	Only happens if after the move the ship is within 10 units and slower than 10 speed.
Boost	[Shield quadrant] [Amount]	`Boost N 40`	Boost a shield quadrant by amount. This costs 1 point of energy per point of shield.	Post-move	You can boost a shield quadrant to twice its normal maximum. However, at the end of a round any excess dissipates.
Activation	[Component] [On/Off]	`Activation C1 On`	Activate/deactivate a component, for components that need activation.	Pre-move	Currently the only component is a Cloak on the H2552 that reduces your visibility by 20% for 10 energy per tick.

A command set for a round could look like below. Note that the order of the lines can be mixed: there is a fixed order that commands will be executed.

```
8: A-30
8: L180
1: Fire M1 35
1: Fire M1 50
6: R30
7: R30
1: L20
1: A30
1: A40
8: Replenish
9: A30
```

- *Tick 1*: the ship accelerates by `70 (1: A30, 1: A40)` but will likely be limited to its maximum acceleration.
- *Tick 1*: the ship turns left by 20 degrees (`1: L20`)
- *Tick 1*Tick 1: the ship fires a rocket 35 degrees to the right of its heading (`1: Fire M1 35`)
- The second Fire command is ignored because it tries to fire the "M1" weapon for a second time that tick (`1: Fire M1 50`)
- *Tick 6 and 7*: the ship turns right by 30 degrees for two ticks (`6: R30, 7: R30`)
- *Tick 8*: the ship slows down by 30 (`8: A-30`) and because its speed is 0 it can make a full reverse turn (`8: L180`)
- *Tick 8*: the ship - assuming it is close enough to a star base - fully replenishes (`8: Replenish`)
- *Tick 9*: the ship accelerates by 30 to fly back to where it came from (`9: A30`)

Tick Processing

Each tick is processed in a specific order, it is useful to know in what order everything is processed. For instance, acceleration is done before turning, so you can do a fast turn within one tick by slowing down to 0 and then turning as much as you want.

1. Start of tick. Some components do upkeep (Laser cools down).

2. Generators generate energy, 1 energy per generator.
3. Components that use energy per tick use their energy, draining the battery. Also the energy drain for the upcoming movement is deducted.
4. Pre-move commands are executed.
    1. Acceleration
    2. Turning
    3. Other pre-move commands (Activation)
4. Movement
5. Post-move commands are executed.
    1. Fire weapons. This is when new missiles appear. Damage is done.
    2. Boost
3. Ships, guided missiles etc. scan their environment.
4. Guided missiles choose and intercept their target. Missiles in range of target explode and do damage.
5. Destroyed objects are removed.

Energy

All the ships energy is stored on its central battery, and it can power several things, like lasers, shields and ship's movement. Every generator on a ship produces 1 energy per tick and stores it in the battery.

Energy is used to:

- Boost shields with the Boost command at 1 point of shield per point of energy.
- Power movement at Speed / 10 energy per tick.
- Power lasers at 5 energy per shot.

Don't forget: a Replenish **completely** fills the battery!

Movement

In movement everything is per tick.

Any object moves its speed every tick. So a ship with a speed of 30 moves 10 * 30 = 300 units in a full round of 10 ticks. A ship has a maximum speed, and can fly backwards with the same (negative) speed.

An object has a maximum turn rate in degrees per tick. An object with a maximum turn rate of 30 can make a full circle in 360 / 30 = 12 ticks.

An object has a maximum acceleration in speed units per tick. So an object with a maximum acceleration of 20 and a maximum speed of 40 can reach maximum velocity in 2 ticks.

Movement costs energy, at speed / 10 points energy per tick, rounded down. For instance, a ship with a speed of 46 will spend 46 / 10 rounded down = 4 energy per tick on movement.

Movement commands

The movement commands are all *per tick*. They are:

`A[number]`
: Accelerate or decelerate by x units that tick. You can fly backwards (negative speed)

`L[degrees]`
: Turn x degrees to the left that tick.

`R[degrees]`
: Turn x degrees to the right that tick.

All movement-related commands are **relative** commands. Turning x degrees with respect to current heading, acceleration changes current speed by x amount, etc.

At speed 0 there is no limit to the turn rate.

If you give multiple turn or accelerate commands *in a single tick*, they get combined (added) into one command for that tick. If you turn beyond the maximum turn rate of the ship, the command gets constrained to the maximum. The same goes for maximum acceleration and speed.

Weapons

Lasers

Lasers are fired at a specific ship and always hit if they are in range. Lasers heat up per shot and can't fire when they are at or over their maximum temperature.Lasers always heat and use energy when fired, even when there's no target, so don't just spam fire commands!

Energy per shot	Damage per shot	Heat per shot	Max Temperature
5	Strength - Distance	20	100

Missiles

Missiles are fired in a direction from a missile launcher. Guided missiles (Splinter) will target the nearest object they see, but not the firing ship or its missiles. Regular Rockets fly in a straight line. Missiles do not target their origin ship and its missiles. However, when a missile explodes, it damages *everything* in range, including its origin ship and rockets.

Missile launchers have limited ammo, but can be restocked by replenishing at a star base.

Currently all missiles have speed 60 and fizzle out after 15 ticks. This means they have a range of 60 * 15 = 750.

Rockets are unguided missiles with a scan- and blast radius of 20 and 50 damage. They fly at a speed of 60 units per tick.

Splinter missiles are guided missile that chase the closest target that is not its originator or its missiles. They fly at a speed of 60 units per tick. The have a scan- and blast radius of 6, and their damage linearly scales down from 75 at 0 distance to 0 damage at 6 distance. They are quite smart in that they predict a target's movement and will on approach will slow down to exactly close the distance to their target. Guided missiles will target other missiles, so shooting a missile back at them is a good way to defend against them.

Defense

Shields

Shields are the outer defense of a ship: a shield has to be broken before the hull is damaged. A ship's shield is divided in quadrants that each cover an arc of 90 degrees

(North, East, South, West). Each quadrant has its own strength and needs to be boosted separately. Each point of shield prevents one point of damage.

Shields can be `Boost`ed to recover them. This uses energy from the battery: 1 point of energy for 1 point of shield. Shields can be boosted to twice their normal maximum, but any excess strength is lost at the end of the round. However, well timed boosts allow you to tank quite some damage!

Cloak

Ships and guided missiles have a scan range within which they can scan objects around them. Some ships have a cloaking device. It shortens the range at which the cloaked ship can be detected. The strength of the cloak determines how much the others' scan range is shortened when detecting the cloaked ship.

If the strength of a cloak is 0.2, it makes the others' scan range a factor 0.2 (20%) shorter, e.g. `100 - 20% = 80`. A ship with a scan range of 100 will not detect a strength-0.2-cloaked ship if it is beyond a range of 80.

Cloaks use 10 energy per tick, and can be turned on and off with the `Activate` command.

Ships

Ships are player-controlled war machines. They come in different configurations.

H2545

Speed	Turn	Acceleration	Hull	Battery	Generators	Scan Distance
45	35	25	100	125/500	8	200
Weapons				**Defense**		
L1: Laser (180 (360)) S1: Launcher (4 Splinter (270, 90)) R1: Launcher (10 Rocket (360)) R2: Launcher (10 Rocket (360))				Shield (150/100/130/100)		

H2552

Speed	Turn	Acceleration	Hull	Battery	Generators	Scan Distance
40	35	20	110	100/500	7	250
Weapons				**Defense**		
L1: Laser (180 (270, 90)) S1: Launcher (10 Splinter (90, 270)) R1: Launcher (15 Rocket (360))				Shield (150/130/140/130)		
ECM						
C1: Cloak (0.2)						

Starbases

Starbases can not move, but they have powerful weapons and defense, and can replenish ships that fly within the maximum replenish distance and speed, and then give the Replenish command.

SB2531

Replenish distance	Replenish speed	Hull	Battery	Generators	Scan Distance
10	10	250	200/1000	12	400
Weapons			**Defense**		
L1: Laser (300 (360)) L2: Laser (300 (360)) S1: Launcher (40 Splinter (360)) S2: Launcher (40 Splinter (360)) R1: Launcher (75 Rocket (360)) R2: Launcher (75 Rocket (360))			Shield (400/400/400/400)		