So, what is it?

This is an expansion pack for Sci-Fi Ship Controller (SSC is sold separately in the Unity Asset Store). So, you'll first need to own Sci-Fi Ship Controller before you can install and use this expansion pack.

This pack includes physics-based missiles (SSC comes with kinematic guided projectiles, which, as the name suggests act more like projectiles that missiles). The missiles in this pack, are multi-staged, self-propelled, launchable, passive-guided missiles with optional physics-based drag.

The missiles are fully integrated with the existing weapon systems available in SSC. This means they can be fired from existing projectile weapons on Sci-Fi ships. They are plug and play with any existing guided projectiles.

Included are ground or surface mounted missile launchers. You can see two different examples of this launcher module in the city defence demo. If we get enough demand for this pack, we hope to make launchers directly mountable on ships.

We've also included smart space mines. These react to nearby target ships or missiles and can automatically disarm when the threat has passed to avoid detonation if the targets get out of range before detonation.

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Features

- Self-guided, self-propelled, multi-stage missiles
- Targets include ships, ship damage regions, gameobjects, and SSC locations
- Smart space mines
- Area of Effect (AoE) for mines and missiles
- Option to detonate missiles before reaching target
- Compatible with SSC radar
- Compatible with SSC weapons
- Compatible with SSC AutoTargetingModule
- Missiles use the pooling system from SSC
- Missiles are usable from player or AI ships
- Missiles use physics-based drag
- Example turret and non-turret missile launchers

How do I get started?

Install Sci-Fi Ship Controller v1.5.6 or newer from the Unity Asset Store. You'll need to be using Unity 2022.3.24 or newer as that is the minimum supported with SSC Expansion Pack 1.

Then, install SSC Expansion Pack 1 in the project.

If you are using URP or HDRP (rather than Built-in Render Pipeline), you may need to look at the SSCXPack1_SRP_readme.txt in the SCSM\SSCXPack1\SRP folder. This will tell you which SRP package you'll need to install from the SRP folder (otherwise all the materials will be pink).

Run the demo scene which can be found in SCSM\SSCXPack1\Demos\Scenes\City Defence Demo. The demo will give you ideas as to how you could make use of the missiles in your own project. Of course, you can make your own launchers and missiles with your own 3D models too.

Support Policy

For free support we will investigate reproducible bugs in our code. We may ask you to provide a simple scene with clear instructions on how to repro the issue. We can provide an upload area for the project files.

If this issue is critical to an announced game release date, we give it high priority. We also help with fleshing out new features that can improve gameplay and that we could add to a new version. In addition, we offer customer support for discovering existing features and how to configure them, both in our Unity forum or on our Discord channels.

To add "polish" to a game or general help with implementing our products (and even writing custom game-play code) we negotiate a flexible hourly rate which can be time-boxed to fit the studio or indie budget.

For ad-hoc on-going support, and to help us to keep supporting Sci-Fi Ship Controller and expansion packs for a long time, please support us on https://www.patreon.com/scsmmedia

We may alter this support policy from time to time without notice.

What's Changed?

Version 1.0.4
[NEW] AoE for missiles
[NEW] Missile AoE Demo
[NEW] Missile detonate before target option
[NEW] ObjectAoE component

Version 1.0.3
[NEW] Smart Space Mines (SSCMineModule)
[NEW] SSCFlashing1 (mine) shader for URP and HDRP
[NEW] Missiles - avoid damage to source ship
[NEW] Launcher - SetRadarVisibility API

Version 1.0.2
[IMPROVED] Ensure Radar is created in the same scene as launcher
[IMPROVED] Updated editor toolbar

Version 1.0.1
[NEW] SSCMissileModule - shield penetration option
[NEW] SSCMissileModule - stage run and completion callbacks
[NEW] SSCMissileModule - Disable FX on Destroy option
[NEW] SSCMissileModule - Inaccuracy option
[NEW] SSCMissileModule - GetStageId and GetStageByIndex APIs
[NEW] SSCMissileModule - overrideable EnableOrDisableFX method
[NEW] SSCMissileModule - StartFX() and StopFX() APIs
[NEW] SSCLauncherModule - Manual Fire option
[NEW] Ship Missile Tester scene
[FIXED] Launcher Identification descriptions missing in manual

Videos and Tutorials

Name	URL
Trailer 2	https://youtu.be/6VbpMOVKv_Y
Mine Basics Tutorial	https://youtu.be/UTNzz-vVY8Y
Big Problems	https://youtu.be/txObBCJLum0
Missile AoE Basics Tutorial	https://youtu.be/jSx04n2Xzi0

Missile Module

This is the core component of the multi-stage missile system. We have several common configurations created for you in the Demos\Prefabs\Missiles folder. You can also create your own either with our missile model or with your own models. To get started you can duplicate one of our prefabs, rename it, and move it to your own folder within your game.

Missiles can be used with the ground-based SSC Launch Module or regular projectile weapons on ships. They are fully integrated into the pooling system provide by Sci-Ship Controller's SSCManager.

When your game is playing in the editor, there is a Debug Mode option in the inspector of each missile in the scene that can provide more information to help you understand what is happening at runtime.

How to Create Missile Prefabs

To create a new Missile:

1. In a scene, create an empty gameobject
2. Rename the empty gameobject. E.g., MyMissile1
3. Either add a mesh and mesh renderer as a child gameobject
4. Where possible, use a simple collider like a capsule or box collider
5. Add a Missile Module script to the parent gameobject
6. Add a Rigidbody to the parent gameobject
7. Create a prefab from the gameobject by dragging the parent gameobject into a folder in the Project pane (avoid using our SCSM folder)
8. Reset the prefab parent transform position and rotation to 0,0,0
9. Ensure the parent gameobject scale is 1,1,1 (to avoid rigidbody issues)
10. Delete the gameobject from the scene

Missile General Tab

This is where you'll find all the general settings for configuring your missiles.

Property	Description
Use Gravity	Whether gravity is applied to the missile. If applied, the amount and direction of gravity will be inherited from the ship or weapon that fired it.
Damage Type	The type of damage the missile does when hitting a ship. The amount of damage dealt to a ship upon collision is dependent on the ship's resistance to this damage type. If the damage type is set to Default, the ship's damage multipliers are ignored i.e. the damage amount is unchanged.
Damage Amount	The amount of damage the missile does on collision with a ship or object. NOTE: Non-ship objects need a DamageReceiver component.
Damage Mask	The layer mask used for collisions with objects that the missile may cause damage. Default: Everything
Damage Range (AoE)	The maximum distance (Area of Effect radius) the missile can inflict damage. If the range < 0.1, there will be no area of effect damage to objects around the detonation point. For performance reasons, only the first 100 discovered meshes within the AoE will be considered.
Max. Explosive Force	The maximum force (in KiloNewtons) to apply to nearby objects when the missile detonates. Non-ship objects need rigidbody and DamageReceiver components.
Damage Layer Mask	The layer mask used when inflicting damage on nearby objects.
Preset	A set of common curve presets.

Property	Description
Damage Curve	The damage inflicted based on the relative distance from the missile on detonation.
Line-of-Sight	Line-of-Sight is required to inflict damage. NOTE: this from the position of the mine to the position of the target and does not take into consideration objects that are partially in view.
Debug AoE	At runtime, in the editor only, it is possible to debug objects within the AoE. This has a significant performance overhead. All potential objects within the Damage Layer Mask will be output to the Unity console window. Objects can be included or excluded using the Damage Layer Mask.
Mass (kg)	The mass of the missile in kilograms
Min Pool Size	When using the Pooling system, this is the number of missile objects kept in reserve for spawning and despawning.
Max Pool Size	When using the Pooling system, this is the maximum number of missiles permitted in the scene at any one time.
Destroyed FX Object	The particle and/or sound effect prefab that will be instantiated when the missile hits something and is destroyed. This does not fire when the missile is automatically despawned.
Shield FX Object	The particle and/or sound effect prefab that will be instantiated, instead of the regular Effects Object, when the missile hits a shielded ship. This does not fire when the missile is automatically despawned.
Launch FX Object	The particle and/or sound effect prefab that will be instantiated when the missile is fired from a weapon.
Launch FX Offset	The distance in local space that the launch Effects Object should be instantiated from the weapon firing point. Typically, only the z-axis will be used.
Col. Damage Resistance	Value indicating the resistance of the missile to damage caused by collisions. Increasing this value will decrease the amount of damage to this missile caused by collisions. As the missile is damaged, its performance will degrade, effecting it's thrust and turning ability.
Inaccuracy	Default to 0 which is the missile will attempt to hit the target. Range from 0.0 to 1.0. The higher the number, the more chance the missile will not hit the target dead centre. NOTE: It has a bit of a performance overhead so only use when required.
Inaccuracy Scale	Default to 1, increasing the scale will increase the chances of the missile missing the target by a larger margin.
Detonate Distance	The distance, in metres, from the target at which the missile will explode when armed.

Missile Stages Tab

This is what makes your missile fly. Typically, you'll use between one and three stages.

Property	Description
Stage Name	The descriptive name of the Missile Stage.
Stage Duration	How many seconds the stage should take to complete.
Blend Duration	The time, in seconds, used to blend from the previous stage. Currently this applies to turning force and thrust.
Armed	Is the object armed and will explode when colliding with another object? If the missile colliders with other objects while not armed, it will receive damage which will affect its performance and ability to seek a target.
Seek Target	Should the missile attempt to intercept the target?

Property	Description
Face Intended	Should the missile face in the intended direction of travel (i.e. where it is facing) rather than the direction it is moving? Only applies when thrust > 0 [DEFAULT: OFF]. This could be useful for missiles are dropped in the first stage with Use Gravity and no thrust, and then have thrust in the second stage.
Ignore Collisions	Should all collisions be ignored during this stage?
Thrust (N)	The thrust force in newtons.
Max Turning Force (kN)	The maximum force used to turn the missile in kilonewtons. Missile with the same turning force but a larger mass will turn more slowly.

Missile Identification Tab

This information helps you identify the missiles during gameplay.

Property	Description
Faction Id	The faction or alliance the item belongs to. This can be used to identify if an item is friend or foe. Default (neutral) is 0.
Model Id	The unique model or type of missiles. Values 1 to 100 are reserved for demo SCSM ships, turrets or missiles. 0 = Not Set.
Visible to Radar	Is this missile visible to radar queries? It will appear as a gameobject entry on radar.
Radar Blip Size	The relative size of the blip on the radar mini-map.

Missile Drag Tab

The drag properties of the missile determine how the airflow around the missile affects the movement of the missile. Use the Drag X/Y/Z Coefficients to alter how much drag the missile has on each axis. More streamlined axes of the missile should have a lower drag coefficient while flatter axes should have a higher drag coefficient. You can use the Angular Drag Factor to alter how quickly angular drag will slow down any spinning motion.

Property	Description
Drag Area (m2)	The area, in square metres, of the model for drag purposes. x = side view area, y = top view area, z = front view area. If you're not sure, look at our prefabs and see how we calculated this from the size of the colliders.
Drag Offset Z	The distance, in metres, to move the drag moments behind the centre of mass on the z-axis. NOTE: You'd never want to move it in front of the centre of mass, else flight would be unstable.
Drage Factor	The overall drag factor that affects drag on the missile. Set to 1 for physically realistic value. Set to 0 to disable drag.
Drag X Coefficient	The coefficient of drag of the missile on the x-axis. Increasing the coefficient of the drag will increase the effect of drag.
Drag Y Coefficient	The coefficient of drag of the missile on the y-axis. Increasing the coefficient of the drag will increase the effect of drag.
Drag Z Coefficient	The coefficient of drag of the missile on the z-axis. Increasing the coefficient of the drag will increase the effect of drag.
Angular Drag Factor	How strong the effect of angular drag is on the missile. Setting this to 1 will make it physically realistic.
Drag Moments Multipliers	Multipliers for drag moments causing rotation along a local axis.
Drag X Multiplier	A multiplier for drag moments causing rotation along the local (pitch) x-axis. Decreasing this will make these moments weaker.
Drag Y Multiplier	A multiplier for drag moments causing rotation along the local (yaw) y-axis. Decreasing this will make these moments weaker.

Property	Description
Drag Z Multiplier	A multiplier for drag moments causing rotation along the local (roll) z-axis. Decreasing this will make these moments weaker.

Missile Launcher

This is a ground-based launcher that can act as a single silo or as a turret with multiple launch tubes. Unlike a regular ground (or ship-mounted) turret, this is specifically designed to work with missiles from this expansion pack.

When your game is playing in the editor, there is a Debug Mode option in the inspector of each missile in the scene that can provide more information to help you understand what is happening at runtime.

Launcher General Tab

Property	Description
Initialise on Start	If enabled, Initialise() will be called as soon as Start() runs. This should be disabled if you want to control when the component is enabled through code.
Auto Create Location	Automatically create a Location in the SSCManager when the launcher is initialised.
Missile Prefab	Prefab template of the missiles fired by this weapon. Missile prefabs need to have a Missile Module script attached to them.
Destroyed FX Object	The particle and / or sound effect prefab that will be instantiated when the launcher is destroyed.
Starting Health	The initial health value of this launcher. This is the amount of damage that needs to be done to the launcher for it to reach its min performance.
Destroy on No Health	Should the launcher be destroyed (removed from the scene) when its health reaches 0?
Destruct Object	The destruct prefab that breaks into fragments when the launcher is destroyed.
Launch Interval	The minimum time (in seconds) between consecutive missile launches.
Relative Position	The position of the weapon in local space relative to the pivot point of the whole launcher. Where possible, make your launcher pivot around the turret pivot point so that relative position is 0,0,0.
Auto Targeting	When the Auto Targeting Module is attached, use this to indicate targets should be assigned to the weapon.
Auto Fire	When a target is selected, the weapon will automatically attempt to fire at the target.
Manual Fire	The weapon can be manually fired with FireIfReady() API
Check Line of Sight	Whether the weapon checks line of sight before firing (in order to prevent friendly fire) each frame. Since this uses raycasts it can lead to reduced performance. Currently has no effect if target is a Location.
Require Target Lock	When firing, does the missile need to be locked on to a target? This is always true for turrets.
Fire Position Offsets	The positions of the launch tubes relative to the position of the weapon.
Fire Direction	The direction in which the weapon fires missiles in local space. +ve Z is fire forwards, -ve Z is fire backwards.
Firing Type	When there are multiple firing positions, when the fire command is issued, how should the weapon respond? By default, all fire positions are fired at the same time (subject to available ammo).
Unlimited Ammo	Can this weapon keep firing and never run out of ammunition?

Property	Description
Ammunition	The quantity of missiles or ammunition available for this weapon.
Heat Level	The heat of the weapon - range 0.0 (starting temp) to 100.0 (max temp).
Heat Up Rate	The rate heat is added. It is inversely proportional to the firing interval (reload time). If rate is 0, heat level never changes.
Cool Down Rate	The rate heat is removed per second. This is the rate the weapon cools when not in use.
Overheating Threshold	The heat level that the weapon will begin to overheat and start being less efficient.
Burnout on Max Heat	When the weapon reaches max heat level of 100, will the weapon be inoperable until it is repaired?

Launcher Identification Tab

This information helps you identify the launcher during gameplay.

Property	Description
Faction Id	The faction or alliance the item belongs to. This can be used to identify if an item is friend or foe. Default (neutral) is 0.
Squadron Id	Although normally representing a squadron of ships, this can be used on a launcher to group it with other things in your scene. Default (unset) is -1.
Model Id	The unique model or type of launcher. Values 1 to 100 are reserved for demo SCSM ships, turrets or missiles. 0 = Not Set.
Visible to Radar	Is this launcher visible to radar queries? It will appear as a gameobject entry on radar.
Radar Blip Size	The relative size of the blip on the radar mini-map.

Launcher Turret Tab

If this launcher has a turret, this information determines how it will behave.

Property	Description
Enable Movement on Init	Should the turret be able to move when the launcher is first initialised?
Turret Pivot Y	The transform of the pivot point around which the turret turns on the local y-axis.
Turret Pivot X	The transform on which the barrel(s) or cannon(s) elevate up or down on the local x-axis.
Turret Min. Y	The minimum angle on the local y-axis the turret can rotate to.
Turret Max. Y	The maximum angle on the local y-axis the turret can rotate to.
Turret Min. X	The minimum angle on the local x-axis the turret can elevate to.
Turret Max. X	The maximum angle on the local x-axis the turret can elevate to.
Turret Move Delay	The time, in seconds, the turret will stop rotating after it has fired. This can be used to give the missile(s) a chance to clear the turret.
Turret Move Speed	The rate at which the turret can rotate.
Turret Inaccuracy	When greater than 0, the number of seconds a turret will wait, after losing a target, to begin returning to the original orientation.
Turret Park Interval	When greater than 0, the number of seconds a turret will wait, after losing a target, to begin returning to the original orientation.

Launcher Environment Tab

Gravitational acceleration and direction, and other environmental factors, can affect how a missile behaves after it has been fired from the weapon.

Property	Description
(Gravity) Acceleration	The acceleration due to gravity in metres per second squared. Earth gravity is approximately 9.81 m/s^2.
(Gravity) Direction	The direction in which gravity acts on the missile in world space.
Medium Density	The density (in kilograms per cubic metre) of the fluid the missile will travel through (usually air). At around sea level, the Earth's atmosphere is approximately 1.293.

Launcher Events Tab

Sometimes you might wish to call your own code when certain things happen with the launcher. This tab lets you setup custom events in the inspector. Alternatively, you could use some of the launcher callbacks (see the Runtime and API chapter).

Property	Description
On Initialised Event Delay	The number of seconds to delay firing the onInitialised event methods after the launcher has been initialised.
On Initialised	These are triggered by a launcher after it is initialised.
On Destroyed	These are triggered when the launcher reaches 0 health.
On Post Launch	These are triggered immediately after a missile is launched.

Mine Module

Smart space mines can be useful if you want to place them where enemy ships or missile might try to attack you or your fellow AI ships. They can be configured to detonate only when they are likely to damage target (enemy) ships or missiles.

Mine General Tab

Property	Description
Initialise on Start	If enabled, Initialise() will be called as soon as Start() runs. This should be disabled if you want to control when the component is enabled through code.
Arm on Init	Arm the moment it is initialised.
Smart Arm	Automatically arm the mine when a target moves into the detection zone.
Smart Detonate	If ships or missiles triggers the mine but leave the detection zone before detonation, the mine will not detonate.
Proximity Collider	The proximity trigger sphere collider on a child gameobject of the mine. Click "New" to create a default one on your mine.
Auto Create Location	Automatically create a Location in the SSCManager when the mine is initialised.
Fuse Duration	The time, in seconds, it takes for the mine to detonate after the mine is triggered.
No Notification Duration	The number of seconds, after initialisation, that events or callbacks will not be called by a ship or missile entering or exiting the detection zone. This can be useful if you do not want a ship within the detection zone to immediately call event or callback notifications when the component is initialised.
Starting Health	The initial health value of this mine.
No Health Action	When the health of the mine reaches zero, the action that will be taken.

Property	Description
Update Timing	The timing method used with the update loop or fuse countdown. If you need to send custom update loop timing to the mine (like say for a multiplayer game), then it can be set to Manual. Otherwise, keep it as Auto.

Mine Arm Tab

Property	Description
Detection Interval	The time in seconds, between the mine scanning the detection zone for undetected targets.
Detection Chance	The chance an object within the detection zone will be detected.
Detection Line-of-Sight	Line-of-Sight is required for detection within the zone. NOTE: This may not be ideal if the target is a large ship and “obscured” by a small object.
Mesh Renderer 1	A mesh renderer (e.g. LOD0) on the mine that contains the material that may change when the mine is armed
Material Index	The zero-based index of a material on mesh renderer 1 that will be used to indicate the mine is armed. Unset = -1.
Mesh Renderer 2	A mesh renderer (e.g. LOD1) on the mine that contains the material that may change when the mine is armed
Material Index	The zero-based index of a material on mesh renderer 2 that will be used to indicate the mine is armed. Unset = -1.
Shader Arm Enable Property	The optional name of the Boolean property in the shader to arm the mine.
Shader Arm Keywords	The optional shader keywords to enable when the mine is enabled.
Shader Trigger Property	The optional name of the Boolean property in the shader to trigger the mine. Typically used to make the shader start flashing.
Shader Colour Name	The optional name of the float property in the shader to change the colour intensity.
Shader Intensity Name	The optional name of the float property in the shader to change the colour intensity.
Shader Speed Name	The optional name of the float property in the shader to change the flashing speed when armed and triggered for detonation.
Shader Flash FX	When armed and triggered for detonation, the shader generates the flashing effect.
Flash Intensity	The colour intensity when the mine is armed.
Variable Intensity	The colour intensity is variable while armed and triggered for detonation.
Preset	A set of common curve presets.
Intensity Curve	The relative colour intensity while armed.
Flash Speed	The rate at which the mine flashes when it is armed and triggered for detonation.
Variable Speed	The flash speed is variable while armed and triggered for detonation.
Preset	A set of common curve presets.
Speed Curve	The relative flashing speed while armed and triggered for detonation.
Start Audio Pitch	If there is an audio clip, the audio pitch at start of the trigger sequence.
End Audio Pitch	If there is an audio clip, the audio pitch at end of the trigger sequence

For the Unity standard shader setup use:

Property	Setting
Shader Arm Enable Property	
Shader Arm Keywords	_EMISSION

Property	Setting
Shader Trigger Property	
Shader Colour Name	_EmissionColor
Shader Intensity Name	
Shader Speed Name	
Shader Flash FX	OFF

For the custom URP and HDRP SSCFlashing1 shader setup use:

Property	Setting
Shader Arm Enable Property	_IsActive
Shader Arm Keywords	
Shader Trigger Property	_IsFlashing
Shader Colour Name	_FlashColour
Shader Intensity Name	_FlashIntensity
Shader Speed Name	
Shader Flash FX	ON

When an AudioSource is attached to the mine, when triggered, the clip will play at approximately the same rate of the flashing speed. It is important to keep the clip short (< 0.5 seconds) so that it doesn't attempt to overlap during the flashing sequence. If the speed is increased so that overlapping occurs the clip may be played when it should.

If you want to increase the speed > 3 times per second, you will need to add your own (shorter) audio clip.

Mine Damage Tab

Property	Description
Take Damage	
Use Damage Multipliers	Whether damage type multipliers are used when calculating damage from projectiles, beams, missiles, and other mines.
Damage Type A-F	The relative amount of damage a Type A-F projectile, beam, missile, or (other) mine will inflict on the object.
Destroyed FX Prefab	The particle and/or sound effect prefab that will be instantiated when the mine detonates.
Destruct Prefab	The optional destruct module prefab that breaks into fragments when the mine is detonated.
Destruct Offset	The offset in the forward direction, from the mines gameobject, that the destruct module is instantiated.
Collision Resistance	The resistance of the mine to damage caused by collisions. Increasing this value will decrease the amount of damage caused to the mine by collisions.
Inflict Damage	
Damage Range (AoE)	The maximum distance (Area of Effect radius) the mine can inflict damage. For performance reasons, only the first 100 discovered meshes within the AoE will be considered.
Damage Type	The type of damage the mine does. The amount of damage dealt to a nearby ship is dependent on the ship's multiplier for this damage type (i.e. if a Type A mine with a damage amount of 10 hits a ship with a Type A damage multiplier of 2, a total damage of 20 will be done to the ship). If the damage type is set to

Property	Description
	Default, the damage multipliers are ignored i.e. the damage amount is unchanged.
Max. Damage Amount	The amount of damage the mine does to a nearby ship or object. NOTE: Non-ship objects need a DamageReceiver component.
Max. Explosive Force	The maximum force (in KiloNewtons) to apply to nearby objects when the mine detonates. Non-ship objects need rigidbody and DamageReceiver components.
Damage Layer Mask	The layer mask used when inflicting damage on nearby objects.
Preset	A set of common curve presets.
Damage Curve	The damage inflicted based on the relative distance from the mine on detonation.
Line-of-Sight	Line-of-Sight is required to inflict damage. NOTE: this from the position of the mine to the position of the target and does not take into consideration objects that are partially in view.

Mine Identification Tab

Property	Description
Faction Id	The faction or alliance the item belongs to. This can be used to identify if an item is friend or foe. Default (neutral) is 0.
Model Id	The unique model or type of mine. Values 1 to 100 are reserved for demo SCSM ships, turrets, mines, or missiles. 0 = Not Set.
Visible to Radar	Is this mine visible to radar queries? It will appear as a gameobject entry on radar.
Radar Blip Size	The relative size of the blip on the radar mini-map.

Mine Targets Tab

This is configuring ships or missiles that can be detected by the mine while in the detection zone (i.e. within the radius of the proximity trigger sphere collider)

Property	Description
Ignore Neutral Faction	Ignore ships and missile that are neutral within the detection zone.
Ignore Same Faction	Ignore ships and missile that are from the same faction within the detection zone.
Detect Missiles	Detect missiles in the detection zone.
Unity Tags	Array of Unity Tags for target ships or missiles that are detected in the zone. If none are provided, all are considered targets. NOTE: All tags MUST exist.
Factions to Include	An optional array of ship or missile Faction Ids to detect when entering the detection zone.
Factions to Exclude	An optional array of ship or missile Faction Ids to ignore when entering the detection zone.
Squadrons to Include	An optional array of ship or missile Squadron Ids to detect when entering the detection zone.
Squadrons to Exclude	An optional array of ship or missile Squadron Ids to ignore when entering the detection zone.
Target Layers	The layer mask used for potential targets.

Mine Events Tab

Property	Description
On Enter Methods	Methods that get called when a ship or missile enters the detection zone. Dynamic custom methods will take 4 integer parameters: ShipId, MissileId, FactionId, InstanceId of the SSCMineModule component in the scene.
On Exit Methods	Methods that get called when a ship or missile exits the detection zone. Dynamic custom methods will take 4 integer parameters: ShipId, MissileId, FactionId, InstanceId of the SSCMineModule component in the scene.
On Destroyed	These are triggered when the mine is destroyed or when it reaches 0 health. See also callbackOnDestroy.

Object AoE component

Add this (optional) component to objects that will add force to that object when first taking damage. Typically used to apply some upward force when impacted by mines and AoE missiles. These are not required (and shouldn't be added) to ships, turrets, missiles, or mines.

Property	Description
Initialise on Start	If enabled, Initialise() will be called as soon as Start() runs. This should be disabled if you want to control when the component is enabled through code.
Explosive Direction	The direction in which to apply the explosive force when it first receives damage.
Explosive Force	The direction in which to apply the explosive force when it first receives damage.
Output Damage	Output the damage received at runtime in the Unity console (Editor only).

Common Issues

Below is a list of common issues people can encounter that are usually fixed by tweaking the configuration of various components.

Common Issues – Mine Module

1. My nearby objects are not affected by the mine when it detonates. Check that they are in the Damage Layer Mask on the Damage tab. Check that there aren't more than 100 non-trigger colliders with the AoE that match the Damage Layer Mask. Ensure that your objects have at least one non-trigger collider.

Common Issues – Missile Module

1. My nearby objects are not affected by the missile when it detonates. On the missile prefab, on the General tab, select "Debug AoE" and check the Console window at runtime to see which objects are discovered. Check that your objects are in the Damage Layer Mask on the Damage tab. Check that there aren't more than 100 non-trigger colliders with the AoE that match the Damage Layer Mask. Ensure that your objects have at least one non-trigger collider.

Common Issues – Missile Launcher

1. My launcher keeps firing missile even though there is no target. If this is not a turret, and "Auto Fire" is enabled on the General tab, enable "Require Target Lock".

2. When my missiles launch, they target missile from the same or another launcher. For missiles fired from launchers in the same faction, they all need to have the same Faction Id, otherwise they will be considered enemy missiles.
3. AutoTargetModule has a target, but the launcher doesn't fire a missile. Check if the launcher is assigned a target with Debug Mode on the launcher. Does the launcher have ammunition? Is Auto Targeting enabled on the General tab? Did the launcher get a target (check Debug Mode on the launcher)? If not, is the target behind the fire direction? If so, the radar target will be considered invalid.

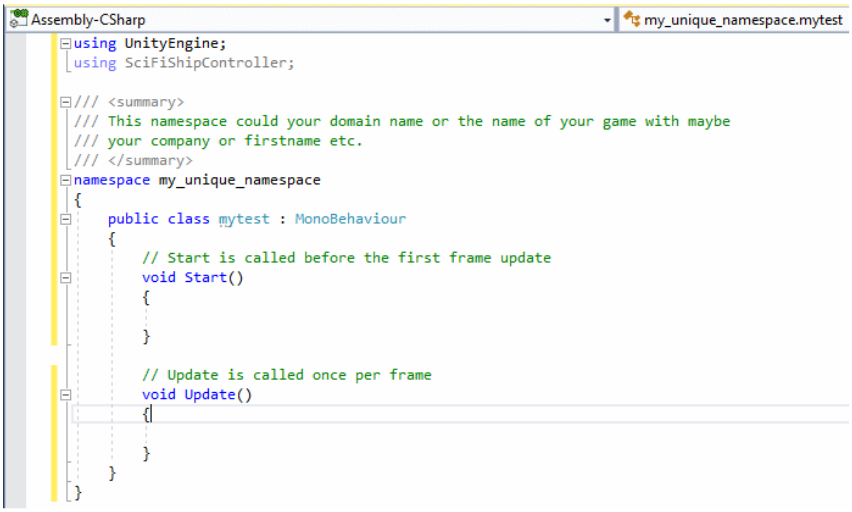
Runtime and API

SSC Expansion Pack 1 is designed to be used in your games. We expect your code to interact with ours. This section, together with the Runtime and API section in the Sci-Fi Ship Controller manual, will help you interact via code with our components.

Runtime General Guidance

Much of our code is well documented and broken down into regions marked with #region #endregion tags. These are expandable in Visual Studio.

When integrating SSC Expansion 1 into your game or project, make sure your scripts are in your own namespace so that they don't conflict with other people's code or assets.



Public Variables and Properties in our scripts are generally available for you to safely access in your own code. Anything marked "[INTERNAL ONLY]", "private" or "internal" should never be used in your code as these items are subject to change and will most likely either break your game or make it behave is a strange manner.

Some of our scripts have Public API methods. These are used in our demo scripts and can safely be used in your game code. Look for these Public API regions at the bottom of our scripts.

```
// Sci-Fi Ship Controller. Copyright (c) 2018-2020 SCSM Pty Ltd. All rights reserved.
namespace SciFiShipController
{
    [AddComponentMenu("Sci-Fi Ship Controller/Ship Control Module")]
    [HelpURL("http://scsmmedia.com/media/ssc_manual.pdf")]
    [RequireComponent(typeof(Rigidbody))]
    public class ShipControlModule : MonoBehaviour
    {
        Public Variables
        Private Variables
        Public Static Version Properties
        Public Delegates
        Private Initialise Methods
        Update Methods
        Private Methods
        Events
        Public API Methods - Initialisation
        Public API Methods - Reset, Enable, Disable Ship
        Public API Methods - Enable, Disable Ship Movement
        Public API Methods - Radar
        Public API Methods - Ship Input
        Public API Methods - Docking
        Public API Methods - Ship AI
    }
    Public Structures
}
```

Many of our public variables, properties, delegate call-backs, and methods are documented in the sections below in this manual. Everything else is documented in our script files. Feel free to contact us in our Unity forum or on our dedicated Discord channel if you are unsure of how a variable or method should be used.

Changing Variable at Runtime

Many public variables are modifiable at runtime from within your own code. Variables are commented so that (a) you know what they do, and (b) you can see if they require a method to be called after changing at runtime. For example, if you change sscLaunchModule.destructObject at runtime, you also need to call the method sscLaunchModule.ReinitialiseTurretDestructObjects ().

Demo Scripts

We have included a collection of helpful scripts that show how certain features can be used in your games or projects. They are subject to change with version upgrades, so are not meant to be used directly in your projects. Instead, the intention is to help you build games with SSC Expansion Pack 1 by providing coding examples. **Do not** make changes to these scripts, instead create your own based on these.

Most scripts have a description at the top and comments throughout.

Script name	Description
DemoCityDefence.cs	A demo script to show how you might defend a city with missile launchers from SSC Expansion Pack 1. It uses a ShipSpawner script to spawn 3 squadrons of ship to attack the city with missile, while the missile launchers in the city attempt to shoot down the incoming missiles and the invading ships.
DemoMissileAoE.cs	Demo script to show a ship attacking a ground installation with missiles that have Area of Effect enabled. This means the missiles can damage nearby objects upon impact.
DemoMissileCallback.cs	Demo script to show how you might use missile callbacks to enable or disable effects attached during different stages.

Script name	Description
SampleLauncherTargetAcquired.cs	Simple script to show how to get notified when a missile launcher has acquired a new target. See instructions at the top of the script. NOTE: This is only a sample to demonstrate how API calls could be used in your own code. You should write your own version of this in your own namespace.

Missile Launcher Methods - Events

These public methods can be accessed from any instance of a SSCLaunchModule in the scene.

Method	Description
RemoveListeners()	Call this when you wish to remove any custom event listeners, like after creating them in code and then destroying the object. You could add this to your game play OnDestroy code.
SetOnInitialisedEvtDelay (float newValue)	Change the amount of time the configured event methods are called after the launcher is initialised. This will have no effect after the launcher is initialised.

Missile Launcher Methods - General

These public methods can be accessed from any instance of a SSCLaunchModule in the scene.

Method	Description
CalculateWeaponTargetScore (SSCRadarBlip targetBlip)	Calculates a weapon targeting score for a target. Higher scores indicate better targets. The maximum score is 1000. Targets behind the launcher get assigned a score of -1 to indicate that they are invalid.
ClearWeaponTarget()	Clears all targeting information for the weapon. This should be called if you do not know if the target is a ship or a gameobject.
CreateLocation (bool removeExisting)	Create a new Location using the SSCManager and add it to Radar if required.
DestroyLauncher (bool runDestruction)	Safely destroy the launcher. If there is a destruction prefab, that can also be run.
FireIfReady()	Launch missile(s) on the weapon if they are loaded and ready. This is a single shot action. For continuous firing, call SetAutoFire().NOTE: This will fire regardless of target lock and Line-of-Sight.
Initialise()	Attempt to initialise the launcher.
PauseLauncher()	Pause the launcher. This prevents it from tracking targets, firing, taking damage, and moving the turret.
ReinitialiseDestructObjects ()	Reinitialises variables required for destruct objects of the launcher. Call after modifying any destruct data for this launcher.
ReinitialiseMissileAndEffects ()	Reinitialises variables required for missile and effects of the launcher. Call after modifying any missiles or effect data for this launcher.
SetAutoFire()	Sets the weapon to automatically fire if a target is acquired and the weapon is ready.
SetFiringType (Weapon.FiringType newFiringType)	Attempt to set the firing type of the launcher.
SetHealth (float newHealthLevel)	Attempt to set the health between 0.0 (no health) and 100.0 (full health)
SetManualFire()	For manually firing the weapon. After this is set, call FireIfReady() to fire the weapon.

Method	Description
SetMissileModule (SSCMissileModule missileModulePrefab)	Change the missile prefab. If required, this calls ReinitialiseMissileAndEffects().
SetRadarVisibility (bool isVisible)	If radar is enabled for this launcher, set its visibility to radar.
SetTarget (GameObject target)	The launcher will track this gameobject.
SetTargetLocation (LocationData targetLocation)	The launcher will track this location.
SetTargetShip (ShipControlModule targetShipControlModule)	The launcher will track this ship.
SetTargetShipDamageRegion (ShipControlModule targetShipControlModule, DamageRegion damageRegion)	The launcher will track this ship's localised damage region.
TelePort (Vector3 delta)	Teleport the launcher to a new location by moving by an amount in the x, y and z directions. This could be useful if changing the origin or centre of your world to compensate for float-point error.
TelePort (Vector3 newPosition, Quaternion newRotation)	Teleport the launcher to a new location with a new rotation.
UnPauseLauncher()	Unpausing the launcher enables it to track targets, fire, taking damage, and move the turret.
WeaponHasLineOfSight (GameObject target, bool directToTarget = false, bool obstaclesBlockLineOfSight = true, bool anyEnemy = true)	Returns whether a weapon has line of sight to a target. If directToTarget is set to true, will raycast directly from the weapon to the target. If directToTarget is set to false, will raycast in the direction the weapon is facing. This method will return true if the raycast hits: a) The target, b) An enemy ship (distinguished by faction ID) - even if it is not the target and anyEnemy is true, c) An object that isn't the target (if obstaclesBlockLineOfSight is set to false), d) Nothing. This method will return false if the raycast hits: a) A friendly ship (distinguished by faction ID), b) An object that isn't the target (if obstaclesBlockLineOfSight is set to true). c) An enemy ship that is not the target when anyEnemy is false.

Missile Launcher Methods - Turret

These public methods can be accessed from any instance of a SSCLaunchModule in the scene.

Method	Description
CheckIsTurret()	Check if this is a turret. Call this if you update the weapon pivot points in code.
DisableTurretMovement()	Stop the turret from rotating.
EnableTurretMovement()	Allow the turret to rotate when required.

Missile Launcher Properties

These public properties can be accessed from any instance of a SSCLaunchModule in the scene.

Property	Description
AimDirection	Where the launcher is currently aiming in world-space.
Health	Attempt to get or set the Launcher's health.
LaunchModuleId	The unique ID of the module at runtime.
IsInitialised	Has the module been initialised?
IsLauncherPaused	Is the launcher paused? This prevents it from tracking targets, firing, taking damage, and moving the turret.
IsTurret	Does the launcher have a turret?
IsTurretMovementEnabled	Get or set if the turret can rotate.
RadarId	The number used by the SSCRadar system to identify this Launcher at a point in time. This should not be stored across frames and is updated as required by the system.
TransformPosition	The position of the launcher as a vector. Derived from the position of the transform.
TransformForward	The forward direction of the launcher in world space as a vector. Derived from the forward direction of the transform.
TransformRight	The right direction of the launcher in world space as a vector. Derived from the right direction of the transform.
TransformUp	The up direction of the launcher in world space as a vector. Derived from the up direction of the transform.
TransformRotation	The rotation of the launcher in world space as a quaternion. Derived from the rotation of the transform.
TransformInverseRotation	The inverse rotation of the launcher in world space as a quaternion. Derived from the rotation of the transform.
IsDestroyed	Has the launcher been destroyed (typically when there is no weapon Health)
TargetShipName	If a ship is being targeted, will return its name.
TargetShipDamageRegionName	If a ship damage region is being targeted, will return its name.
TargetGameObjectName	If a gameobject is being targeted, will return its name
TargetLocationName	If a location is being targeted, will return its name.

Missile Launcher Call Backs

Custom runtime methods should be a lightweight to avoid performance issues. These single-cast delegates can have a single instance of a call-back method. This is useful when you want to take some (custom) action when something occurs, like when a launcher is destroyed by a projectile or missile.

These can be referenced or called from an instance of sscLauncherModule.

Property or Method	Description
CallbackOnDestroy callbackOnDestroy	The name of the custom method that is called immediately before the launcher is destroyed. Your method must take 1 parameter of class SSCLaunchModule. This should be a lightweight method to avoid performance

Property or Method	Description
	issues. It could be used to update a score or affect the status of a mission. For this to be called you need to attach a DamageReceiver component. As an alternative, you could use OnDestroyed from the Events tab of the Missile Launcher component.
CallbackOnTargeted callbackOnTargeted	The name of the custom method that is called immediately after the missile launcher acquires a new target. Your method must take 5 parameters (SSCLaunchModule, ShipControlModule, DamageRegion, Gameobject, and LocationData). Any of the last 4 parameters can be null. This should be a lightweight method to avoid performance issues.

Missile Module Properties

These public properties can be accessed from any instance of a SSCMissileModule in the scene.

Property or Method	Description
CurrentMaxTurningForce	The current maximum turning force being applied to the missile in Newtons.
CurrentPerformance	The current performance or health of the missile.
CurrentStage	If initialised, return the current stage.
CurrentStageName	If initialised, return the current stage name (this is typically only used for debugging).
DetonateDistance	Get or set the distance, in metres, the missile will explode when armed before reaching the target.
LocalVelocity	Get the local space velocity of the missile
InflictDamageCurve	Get or set the inflict damage curve.
IsArmed	Is the missile currently armed?
IsDestroyed	Has the missile been destroyed (typically after it detonates or has been deactivated).
IsIgnoringCollisions	Is the missile currently ignoring collisions with all other objects?
IsMissile	Is this projectile a missile from SSC Expansion Pack 1?
MaxExplosiveForce	Get or set the maximum force in Kilonewtons to apply to nearby objects when the missile detonates.
NumberOfStages	Get the number of stages for this missile.
StageList	Return the list of missile stages.

Missile Module Methods - Drag

These public methods can be accessed from any instance of a SSCMissileModule in the scene.

Property or Method	Description
DirtyDragCache()	Typically, only called from an editor script to show that properties affecting drag have been changed.

Missile Module Methods - General

These public methods can be accessed from any instance of a SSCMissileModule in the scene.

Property or Method	Description
ApplyDamage (float inflictedDamageAmount)	Apply damage to a missile. If the missile is armed, it will immediately detonate.
ApplyDamage (float inflictedDamageAmount, DamageType inflictedDamageType, Vector3 hitPoint)	See Virtual Methods
GetDefaultInflictDamageCurve()	Return the default inflict damage animation curve.
SetDetonateDistance (float newDistance)	Set the distance, in metres, the missile will explode when armed before reaching the target.
SetInflictDamageCurve (AnimationCurve newCurve)	Attempt to set the inflict damage curve.
SetMaxExplosiveForce (float newAmount)	Set the maximum force in Kilonewtons to apply to nearby objects when the missile detonates. NOTE: Non-ship objects need rigidbody and DamageReceiver components.

Missile Module Methods - FX

These public methods can be accessed from any instance of a SSCMissileModule in the scene.

Property or Method	Description
StartFX()	Attempt to start the FX attached to this missile.
StopFX()	Attempt to stop the FX attached to this missile.

Missile Module Methods - Stages

These public methods can be accessed from any instance of a SSCMissileModule in the scene.

Property or Method	Description
GetStageById (int stageId)	Attempt to get a stage using its unique identifier (StageId).
GetStageId (int stageNumber)	Attempt to return the State ID given the number in the list on the Stages tab. Returns 0 if the number is invalid or the stage slot is empty.
GetStageByIndex (int stageIndex)	Attempt to return the stage give the zero-based index in the list

Missile Module Virtual Methods

These methods can be overridden.

Property or Method	Description
ApplyDamage (float inflictedDamageAmount, DamageType inflictedDamageType, Vector3 hitPoint)	Apply damage to a missile. This is automatically called by nearby mines. If the missile is armed, it will immediately detonate.
GuideMissileToTarget()	Update desiredDirectionWS or do nothing.
InitialiseMissile()	Initialise the missile after the base projectile has been (custom) initialised.
EnableOrDisableFX (bool isEnable)	Attempt to enable or disable any FX attached to this missile.
MissileCollision (Collision collision)	Check if the missile has hit a damageable object.

Property or Method	Description
IEnumerator RunStage (SSCMissileStage stage, int stageIndex)	Run a missile stage and notify when completed.

Missile Module Call Backs

Custom runtime methods should be a lightweight to avoid performance issues. These single-cast delegates can have a single instance of a call-back method. This is useful when you want to take some (custom) action when something occurs, like when a missile stage runs or completes, and a visual FX needs to be modified.

These can be referenced or called from an instance of SSCMissileModule.

Property or Method	Description
CallbackOnRunStage callbackOnRunStage	The name of the custom method that is called immediately after the stage becomes active. Your method must take 2 parameters (SSCMissileModule and SSCMissileStage) and should be light weight to avoid performance issues.
CallbackOnTargeted callbackOnTargeted	The name of the custom method that is called immediately after the stage has been completed. Your method must take 2 parameters (SSCMissileModule and SSCMissileStage) and should be light weight to avoid performance issues.

Mine Module Properties

These public properties can be accessed from any instance of a SSCMineModule in the scene.

Property or Method	Description
DetectionInterval	Get or set the time in seconds, between the mine scanning the detection zone for undetected targets.
FuseDuration	Get or set the time it takes, in seconds, for the mine to detonate after the mine is triggered.
Health	Get or set the mine health level.
IsArmed	Get or set if the mine is armed and ready to trigger detonation?
IsDestroyed	Has the mine been destroyed (typically when it detonates).
IsInitialised	Is the mine initialised?
IsOnlyVisibleRadarArmed	Get or set if the mine only visible to radar when armed.
IsRadarEnabled	Is radar enabled for this mine. NOTE: It does not have to be visible to others
IsTriggered	Has the mine been triggered to detonate?
IsVariableIntensity	The colour intensity while armed is variable.
IsVariableSpeed	The flashing speed while armed is variable.
IntensityCurve	Get or set the colour intensity curve.
MineId	The runtime unique identification for this mine.
MineRigidbody	The rigidbody used on this mine.
ProximityCollider	Get or set the proximity collider. It must be on a child gameobject within the prefab.
RadarId	The number used by the SSCRadar system to identify this mine at a point in time. This should not be stored across frames and is updated as required by the system.
SpeedCurve	Get or set the speed curve.

Mine Module Methods - Armed

These public methods can be accessed from any instance of a SSCMineModule in the scene.

Property or Method	Description
GetDefaultIntensityCurve()	Return the default variable colour intensity animation curve.
GetDefaultSpeedCurve()	Return the default variable speed animation curve.
ReinitialiseAudio()	Call this if adding or removing an audio clip after the mine is initialised.
ReinitialiseMaterials()	Get the materials from the mesh renderers. This is automatically called during Initialise() from ReinitialiseShaderVariables().
ReinitialiseShaderVariables()	Reinitialise the PropertyIDs for the shader property names. Get base colour used with Intensity from materials. Dependency: ReinitialiseMaterials().
SetDetectionInterval (float newInterval)	Set the time in seconds, between the mine scanning the detection zone for undetected targets.
SetIntensityCurve (AnimationCurve newCurve)	Attempt to set the variable colour intensity curve.
SetSpeedCurve (AnimationCurve newCurve)	Attempt to set the variable speed curve.

Mine Module Methods – Custom Timing

These public methods can be accessed from any instance of a SSCMineModule in the scene.

Property or Method	Description
SetTimingUpdateLoop (Ship.SSCTiming newTiming)	Set the timing method used with the update loop.
UpdateLoop (float updateDeltaTime)	This is typically called automatically during Update(). However, if UpdateTiming is Manual, this method should be called in your own code.

Mine Module Methods - Damage

These public methods can be accessed from any instance of a SSCMineModule in the scene.

Property or Method	Description
GetDefaultInflictDamageCurve()	Return the default inflict damage animation curve.
GetDamageMultiplier (ProjectileModule.DamageType damageType)	Returns the damage multiplier for damageType.
ReinitialiseDestructObjects()	Reinitialises variables required for Destruct Module.
ReinitialiseEffects()	Reinitialise EffectsObjects.
SetDamageMultiplier (ProjectileModule.DamageType damageType, float damageMultiplier)	Sets the damage multiplier for damageType to damageMultiplier.
SetDestructObjectPrefab (DestructModule destructModulePrefab)	Set or change the optional DestructModule prefab used when the mine detonates.
SetDestroyFXOPrefab (EffectsModule newDestroyFXPrefab)	Set or change the optional EffectsModule used when the mine is detonated.
SetInflictDamageCurve (AnimationCurve newCurve)	Attempt to set the inflict damage curve.
SetMaxDamageAmount (float newAmount)	Set the maximum damage to apply to nearby objects when the mine detonates.

Property or Method	Description
SetMaxExplosiveForce (float newAmount)	Set the maximum force in KiloNewtons to apply to nearby objects when the mine detonates. NOTE: Non-ship objects need rigidbody and DamageReceiver components.
TakeDamage (float damageAmount, ProjectileModule.DamageType damageType = ProjectileModule.DamageType.Default, Vector3 damagePointLS = new Vector3())	Take damage and apply it to the mine.
VerifyMultiplierArray()	Verify that the damage multiplier array is correctly sized.

Mine Module Methods - Events

These public methods can be accessed from any instance of a SSCMineModule in the scene.

Property or Method	Description
RemoveListeners()	Call this when you wish to remove any custom event listeners. This is automatically called when the mine detonates.

Mine Module Methods - General

These public methods can be accessed from any instance of a SSCMineModule in the scene.

Property or Method	Description
Arm ()	Arm the mine. Existing targets within the detection zone, will be at risk of being detected.
ArmWithDetection()	Arm the mine because targets have been detected in the detection zone.
CreateLocation (bool removeExisting)	Create a new Location using the SSCManager and add it to Radar if required.
Detonate (bool isInstant)	If armed, attempt to detonate the mine.
Disarm()	Prevent the mine from detonating.
Initialise()	Attempt to initialise the mine.
GetLocalPosition (Vector3 wsPosition)	Get a local space position on the mine, given a world space position (converts a world space position to a local space position on the mine).
SetArmedColourName (string newName)	Set the name of the shader property used for the base colour when armed.
SetFuseDuration (float newDuration)	Set the time it takes, in seconds, for the mine to detonate after the mine is triggered.
SetHealth (float newHealth)	Attempt to set the health of the mine. Values should be between 0 and 100. Take No Health Action if health falls to zero.
SetNoHealthAction (NoHealthAction newAction)	Attempt to set an action when the mine reaches zero health.
SetProximityCollider (SphereCollider proxCollider)	Set the proximity trigger collider for this mine module.
StartDetection()	Attempt to start detecting ships or missile that are already in the detection zone.
StopDetection()	Stop detecting ships or missiles that may already be in the detection zone.
StopDetonation()	If the denotate sequence is running, prevent the mine from detonation.
ToggleArmDisarm()	Arm or disarm the mine.
TurnNotificationsOn()	Allow event and callback notifications to be called when a ship or missile enters or exits the detection zone.

Property or Method	Description
TurnNotificationsOff()	Stop event and callback notifications being triggered when a ship enters or exits the detection zone.

Mine Module Methods - Identification

These public methods can be accessed from any instance of a SSCMineModule in the scene.

Property or Method	Description
DisableRadar()	Disables radar on this mine. For a more lightweight solution use SetRadarVisibility(false).
EnableRadar()	Attempt to enable radar. To make visible to radar if already enabled, use SetRadarVisibility(true).
SetOnlyVisibleRadarArmed (bool newValue)	Set if the mine is only visible to radar when armed. NOTE: This can still be overridden with SetRadarVisibility (isVisible).
SetRadarVisibility (bool isVisible)	If radar is enabled for this mine, set its visibility to radar.

Mine Module Methods - Targets

These public methods can be accessed from any instance of a SSCMineModule in the scene.

Property or Method	Description
SetFactionsToExclude (int[] newFactionsToExclude)	Set a new array of Faction Ids to exclude as targets.
SetFactionsToInclude (int[] newFactionsToInclude)	Set a new array of Faction Ids to include as targets.
SetSquadronsToExclude (int[] newSquadronsToExclude)	Set a new array of Squadron Ids to exclude as targets.
SetSquadronsToInclude(int[] newSquadronsToInclude)	Set a new array of Squadron Ids to exclude as targets.
SetTags (string[] newTags)	Set a new array of Unity tag targets.

Mine Module Call Backs

These (delegates) are used when you wish to call a custom method in your own game code. Be careful not to hold references to objects passed as parameters outside your method otherwise Unity's garbage collector may not be able to release some things from memory.

Subscribe to callbacks using the += MyMethod notation and remember to unsubscribe using -= MyMethod to avoid any memory leaks. You may want to unsubscribe in OnDisable() or OnDestroy() events.

These can be referenced or called from an instance of SSCMineModule.

Property or Method	Description
CallbackOnCollision callbackOnCollision	Subscribe with a custom method to this to be notified immediately after a collision. Your method must take 2 parameters (SSCMineModule and Collision). This should be a lightweight method to avoid performance issues. These methods will be called INSTEAD OF TakeCollisionDamage(..).
CallbackOnDestroy callbackOnDestroy	Subscribe with a custom method that is called immediately before the mine is destroyed. Your method must take 1 parameter of class

Property or Method	Description
	SSCMineModule. This should be a lightweight method to avoid performance issues. It could be used to update a score or affect the status of a mission.
CallbackOnEnter callbackOnEnter	Subscribe with a custom method custom method that is called immediately after a ship or missile that fits the criteria enters the detection zone Your method must take 3 parameters: ShipControlModule, SSCMissileModule, and SSCMineModule. This should be a lightweight method to avoid performance issues.
CallbackOnExit callbackOnExit	Subscribe with a custom method that is called immediately after a ship or missile that fits the criteria exits the detection zone. Your method must take 3 parameters: ShipControlModule, SSCMissileModule, and SSCMineModule. his should be a lightweight method to avoid
CallbackOnTimingUpdateChanged callbackOnTimingUpdateChanged	Subscribe to this to get notified when timingUpdateLoop is changed.

Release History

Initial Release – 20 Jun 2024

Version 1.0.1 – 16 Oct 2024
[NEW] SSCMissileModule - shield penetration option
[NEW] SSCMissileModule - stage run and completion callbacks
[NEW] SSCMissileModule - Disable FX on Destroy option
[NEW] SSCMissileModule - Inaccuracy option
[NEW] SSCMissileModule - GetStageId and GetStageByIndex APIs
[NEW] SSCMissileModule - overrideable EnableOrDisableFX method
[NEW] SSCMissileModule - StartFX() and StopFX() APIs
[NEW] SSCLauncherModule - Manual Fire option
[NEW] Ship Missile Tester scene
[FIXED] Launcher Identification descriptions missing in manual

Version 1.0.2 – 02 Dec 2024
[IMPROVED] Ensure Radar is created in the same scene as launcher
[IMPROVED] Updated editor toolbar

Version 1.0.3 – 21 Jul 2025
[NEW] Smart Space Mines (SSCMineModule)
[NEW] SSCFlashing1 (mine) shader for URP and HDRP
[NEW] Missiles - avoid damage to source ship
[NEW] Launcher - SetRadarVisibility API

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