

# Starcraft Environment Manual

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## Chapter 1

# Percepts

This section will list all the percepts that are usable in the Starcraft environment. The percepts vary per unit, for example: an attacking unit will not percept the amount of resources available to the player as he does not need them. For the implementation of these percepts in your GOAL code, please refer to the GOAL manual.

## 1.1 Percepts for all units

These percepts are available to all the units and buildings.

### 1.1.1 Generic unit percepts

#### Idle percept

Description	If this percept is perceived, this unit is currently idling.
Type	Send on change
Syntax	idle
Parameters	This percept has no parameters.

#### ID percept

Description	The ID of this unit, ID's are unique.
Type	Send once
Syntax	id(<ID>)
Parameters	<ID>: The id of this unit, this is a numeral value.

#### Unit type percept

Description	The Type of this unit, for example "Terran Marine".
Type	Send once
Syntax	unitType(<Type>)
Parameters	<Type>: The type of this unit, this is a string value.

#### Is being constructed percept

Description	If this percept is perceived, this unit is not yet ready.
Type	Send on change
Syntax	isBeingConstructed
Parameters	This percept has no parameters.

**Position percept**

Description	The position of this unit in the world.
Type	Send on change
Syntax	position(<X>,<Y>)
Parameters	<X>: The X value of the position in the world. <Y>: The Y value of the position in the world.

**Build tile position percept**

Description	The position of the build tile this unit is currently standing on.
Type	Send on change
Syntax	buildTilePosition(<X>,<Y>)
Parameters	<X>: The X value of the build tile position in the world. <Y>: The Y value of the build tile position in the world.

**1.1.2 Map percepts****Map percept**

Description	Percepts the width and the height of the map.
Type	Send once
Syntax	map(<Width>,<Height>)
Parameters	<Width>: The width of the map. <Height>: The height of the map.

**Base percept**

Description	Percepts the base locations present on the map.
Type	Send once
Syntax	base(<X>,<Y>,<IsStart>,<RegionID>)
Parameters	<X>,<Y>: The coordinates of the baselocation. <IsStart>: 'true' when the location is a starting point, else 'false'. <RegionID>: The ID of the region this location is in.

**Chokepoint percept**

Description	Percepts the chokepoints present on the map.
Type	Send once
Syntax	chokepoint(<X>,<Y>)
Parameters	<X>,<Y>: The coordinates of the chokepoint.

**1.1.3 Enemy percepts****Enemy percept**

Description	Percepts the enemies that are currently visible to the player.
Type	Send on change
Syntax	enemy(<Name>,<ID>,<Health>,<Shields>,<WX>,<WY>,<BX>,<BY>)
Parameters	<Name>: The name of the unit. <ID>: The ID of the unit. <Health>: The health of the unit. <Shields>: The amount of shield of the unit. <WX>,<WY>: The world coordinates of the unit. <BX>,<BY>: The build tile coordinates of the unit.

**1.1.4 Player unit percepts****Friendly percept**

Description	Percepts all the friendly units.
Type	Send on change
Syntax	friendly(<Name>,<Type>,<ID>,<Health>,<Shields>,<WX>,<WY>,<BX>,<BY>)
Parameters	<Name>: The agent name of the unit. <Type>: The type of the unit. <ID>: The ID of the unit. <Health>: The health of the unit. <Shields>: The amount of shield of the unit. <WX>,<WY>: The world coordinates of the unit. <BX>,<BY>: The build tile coordinates of the unit.

## 1.2 Building percepts

These percepts are available to buildings.

### 1.2.1 Available Resources

#### Minerals percept

Description	Percepts the amount of minerals currently available to the player.
Type	Send on change
Syntax	minerals(<Quantity>)
Parameters	<Quantity>: The amount of minerals available.

#### Gas percept

Description	Percepts the amount of gas currently available to the player.
Type	Send on change
Syntax	gas(<Quantity>)
Parameters	<Quantity>: The amount of gas available.

#### Supply percept

Description	Percepts the amount of supply used and the maximum amount of supply. NOTE: supply is multiplied by 2, so 10 supply in game corresponds with 20 supply in the environment.
Type	Send on change
Syntax	supply(<Current>,<Max>)
Parameters	<Current>: The amount of supply currently in use. <Max>: The maximum amount of supply that is available at this moment.



### 1.2.2 Queue size

#### Queue size percept

Description	The queue size of the building, this indicates how many units are currently being build by this building.
Type	Send on change
Syntax	queueSize(<Quantity>)
Parameters	<Quantity>: The amount of units currently being trained.

### 1.2.3

#### Build unit percept

Description	The id of the unit that is currently being built by this building.
Type	Send on change
Syntax	buildUnit(<ID>)
Parameters	<ID>: The ID of the unit.

### 1.2.4 Research

#### Research percept

Description	The name of the tech that is being researched.
Type	Send on change
Syntax	research(<Name>)
Parameters	<Name>: The name of the tech that is being researched.

### 1.2.5 Rally point

#### Rally point percept

Description	The position of the rally point.
Type	Send on change
Syntax	rallyPoint(<X>,<Y>)
Parameters	<X>,<Y>: The coordinates of the rally point.

**Rally unit percept**

Description	The unit the rally point points to.
Type	Send on change
Syntax	rallyUnit(<Unit>)
Parameters	<Unit>: The unit the rally point points to.

**1.2.6 Terran building percepts****Lifted percept**

Description	This is perceived when this building is lifted.
Type	Send on change
Syntax	lifted
Parameters	This percept does not have any parameters.

## 1.3 Refinery percepts

These percepts are available to refineries.

### 1.3.1 Worker activity

#### Worker activity percept

Description	Information on what workers are currently doing.
Type	Send on change
Syntax	<code>workerActivity(&lt;ID&gt;,&lt;Activity&gt;)</code>
Parameters	<code>&lt;ID&gt;</code> : The ID of the worker. <code>&lt;Activity&gt;</code> : The activity that the worker is currently doing, one of the following: <code>gatheringGas</code> , <code>gatheringMinerals</code> , <code>constructing</code> or <code>idling</code> .

## 1.4 Attack unit percepts

These percepts are available to units that can attack.

### 1.4.1 Attacking units

#### Attacking percept

Description	Indicates which units are the targets of friendly units.
Type	Send on change
Syntax	attacking(<ID>,<TargetID>)
Parameters	<ID>: The ID of a friendly unit. <TargetID>: The ID of the enemy unit that the friendly unit is attacking.

## 1.5 Worker percepts

These percepts are available to SCV's.

### 1.5.1 Available Resources

#### Minerals percept

Description	Percepts the amount of minerals currently available to the player.
Type	Send on change
Syntax	minerals(<Quantity>)
Parameters	<Quantity>: The amount of minerals available.

#### Gas percept

Description	Percepts the amount of gas currently available to the player.
Type	Send on change
Syntax	gas(<Quantity>)
Parameters	<Quantity>: The amount of gas available.

#### Supply percept

Description	Percepts the amount of supply used and the maximum amount of supply. NOTE: supply is multiplied by 2, so 10 supply in game corresponds with 20 supply in the environment.
Type	Send on change
Syntax	supply(<Current>,<Max>)
Parameters	<Current>: The amount of supply currently in use. <Max>: The maximum amount of supply that is available at this moment.

### 1.5.2 Builder unit

#### Constructing percept

Description	Percepts whether or not this unit is constructing.
Type	Send on change
Syntax	constructing
Parameters	This percept does not have any parameters

### 1.5.3 Gatherer unit

#### Carrying percept

Description	Percepts whether or not this unit is carrying resources.
Type	Send on change
Syntax	carrying
Parameters	This percept does not have any parameters

#### Gathering percept

Description	Percepts if the unit is gathering and what the unit is gathering.
Type	Send on change
Syntax	<code>gathering(&lt;Resource&gt;)</code>
Parameters	<code>&lt;Resource&gt;</code> : The resource that is being gathered, either 'vespene' or 'mineral'.

#### Gathering percept (Other unit)

Description	Percepts if another unit is gathering and what the other unit is gathering.
Type	Send on change
Syntax	<code>gathering(&lt;ID&gt;,&lt;Resource&gt;)</code>
Parameters	<code>&lt;ID&gt;</code> : The ID of the unit. <code>&lt;Resource&gt;</code> : The resource that is being gathered, either 'vespene' or 'mineral'.

#### Vespene geyser percept

Description	Percepts a vespene geyser on the map.
Type	Send on change
Syntax	<code>vespeneGeyser(&lt;ID&gt;,&lt;Resources&gt;,&lt;ResourceGroup&gt;,&lt;X&gt;,&lt;Y&gt;)</code>
Parameters	<code>&lt;ID&gt;</code> : The ID of the geyser. <code>&lt;Resources&gt;</code> : The amount of resources left in the geyser. <code>&lt;ResourceGroup&gt;</code> : The resource group. <code>&lt;X&gt;,&lt;Y&gt;</code> : The coordinates of the geyser, a refinery can be built at this position.

## 1.6 Transporter percepts

These percepts are available to units with transport capabilities.

### 1.6.1 Transporter

#### Space provided percept

Description	Information about the maximum transport capacity and the current load.
Type	Send on change
Syntax	spaceProvided(<Used>,<Max>)
Parameters	<Used>: The amount of units this vehicle is currently carrying. <Max>: The maximum carrying amount of this vehicle.

#### Unit loaded percept

Description	Information about the units that are currently inside this vehicle.
Type	Send on change
Syntax	unitLoaded(<ID>,<Type>)
Parameters	<ID>: The ID of the unit. <Type>: The type of the unit.

## 1.7 Command center percepts

These percepts are available to command centers.

### 1.7.1 Idle workers

#### Idle worker percept

Description	Lists the workers that are idle.
Type	Send on change
Syntax	idleWorker(<Name>)
Parameters	<Name>: The name of the unit.

### 1.7.2 Worker activity

#### Worker activity percept

Description	Information on what workers are currently doing.
Type	Send on change
Syntax	workerActivity(<ID>,<Activity>)
Parameters	<ID>: The ID of the worker. <Activity>: The activity that the worker is currently doing, one of the following: gatheringGas, gatheringMinerals, constructing or idling.



## Chapter 2

# Actions

This section will list all the actions that are usable in the Starcraft environment.

### 2.1 Attack action

Description	Attack a unit or building.
Syntax	attack(<TargetID>)
Parameters	<TargetID>: The ID of the target that has to be attacked.
Effects	If the unit is attack capable, attack the target.

### 2.2 Attack move action

Description	Go to a location and attack everything you encounter.
Syntax	attack(<X>,<Y>)
Parameters	<X>,<Y>: The coordinates to move to.
Effects	Go to a location and attack every enemy encountered if a unit can move and is attack capable.

### 2.3 Upgrade action

Description	Upgrade an upgrade.
Syntax	upgrade(<UpgradeName>)
Parameters	<UpgradeName>: The name of the upgrade you want to upgrade.
Effects	Buy an upgrade.
NOTE	At the moment this is only possible with the terran engineering bay and terran academy.

## 2.4 Build action

Desription	Build a building.
Syntax	build(<Type>,<X>,<Y>)
Parameters	<Type>: The Type of the building that has to be built. <X>,<Y>: The coordinates to build on.
Effects	Build a building at the location specified if this unit is capable to do so.

## 2.5 Gather action

Desription	Instruct a unit to gather a resource.
Syntax	gather(<ID>)
Parameters	<ID>: The ID of the resource to gather.
Effects	The unit starts gathering the resource if this unit is capable to do so.

## 2.6 Move action

Desription	Instruct a unit to move to a location.
Syntax	move(<X>,<Y>)
Parameters	<X>,<Y>: The coordinates to move to.
Effects	Go to a location if a unit can move.

## 2.7 Train action

Desription	Train a unit from a building.
Syntax	train(<Type>)
Parameters	<Type>: The type of unit to train.
Effects	If a unit can be built from this building, train the unit if there are enough resources.

## 2.8 Stop action

Desription	Stop a unit.
Syntax	stop
Effects	Stops this unit from doing what he is doing.

## 2.9 Use action

Desription	Use a technology.
Syntax	use(<Type>)
Parameters	<Type>: The type of technology to use.
Effects	If this unit can use the tech and it is researched, use the technology.

## 2.10 Use on target action

Desription	Use a technology on a target.
Syntax	use(<Type>, <Target>)
Parameters	<Type>: The type of technology to use. <Target>: The target to use the technology on.
Effects	If this unit can use the tech and it is researched, use the technology on the target.

## 2.11 Use on location action

Desription	Use a technology on a location.
Syntax	use(<Type>, <X>, <Y>)
Parameters	<Type>: The type of technology to use. <X>,<Y>: The coordinates to use the technology on.
Effects	If this unit can use the tech and it is researched, use the technology on the location.

## 2.12 Research action

Desription	Research a technology.
Syntax	research(<Type>)
Parameters	<Type>: The type of technology to research.
Effects	If this building can research this tech, research the technology.

### 2.13 Set rally point action

Description	Set the rally point of a building.
Syntax	setRallyPoint(<X>, <Y>)
Parameters	<X>,<Y>: The coordinates to set the rally point to.
Effects	If this unit can set a rally point, set it to the specified location.

### 2.14 Set rally point to unit action

Description	Set the rally point of a building.
Syntax	setRallyPoint(<Unit>)
Parameters	<Unit>: The unit to set the rally point to.
Effects	If this unit can set a rally point, set it to the specified unit.

### 2.15 Lift action

Description	Lift a building.
Syntax	lift
Effects	The building starts flying.
Note	Only for Terran buildings

### 2.16 Land action

Description	Land the unit.
Syntax	land(<X>, <Y>)
Parameters	<X>,<Y>: The coordinates to land on.
Effects	If the unit is lifted, land the unit on the location.
Note	The location has to be visible

## Chapter 3

# TechTypes

Here is a list of technology types that can be researched and used.

Stim Packs  
Lockdown  
EMP Shockwave  
Spider Mines  
Scanner Sweep  
Tank Siege Mode  
Defensive Matrix  
Irradiate  
Yamato Gun  
Cloaking Field  
Personnel Cloaking  
Burrowing  
Infestation  
Spawn Broodlings  
Dark Swarm  
Plague  
Consume  
Ensnare  
Parasite  
Psionic Storm  
Hallucination  
Recall  
Stasis Field  
Archon Warp

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Restoration  
Disruption Web  
Mind Control  
Dark Archon Meld  
Feedback  
Optical Flare  
Maelstrom  
Lurker Aspect  
Healing

## Chapter 4

# UpgradeTypes

Here is a list of upgrade types that can be researched.

Terran Infantry Armor  
Terran Vehicle Plating  
Terran Ship Plating  
Zerg Carapace  
Zerg Flyer Carapace  
Protoss Ground Armor  
Protoss Air Armor  
Terran Infantry Weapons  
Terran Vehicle Weapons  
Terran Ship Weapons  
Zerg Melee Attacks  
Zerg Missile Attacks  
Zerg Flyer Attacks  
Protoss Ground Weapons  
Protoss Air Weapons  
Protoss Plasma Shields  
U 238 Shells  
Ion Thrusters  
Titan Reactor  
Ocular Implants  
Moebius Reactor  
Apollo Reactor  
Colossus Reactor  
Ventral Sacs

Antennae  
Pneumatized Carapace  
Metabolic Boost  
Adrenal Glands  
Muscular Augments  
Grooved Spines  
Gamete Meiosis  
Metasynaptic Node  
Singularity Charge  
Leg Enhancements  
Scarab Damage  
Reaver Capacity  
Gravitic Drive  
Sensor Array  
Gravitic Boosters  
Khaydarin Amulet  
Apial Sensors  
Gravitic Thrusters  
Carrier Capacity  
Khaydarin Core  
Argus Jewel  
Argus Talisman  
Caduceus Reactor  
Chitinous Plating  
Anabolic Synthesis  
Charon Boosters