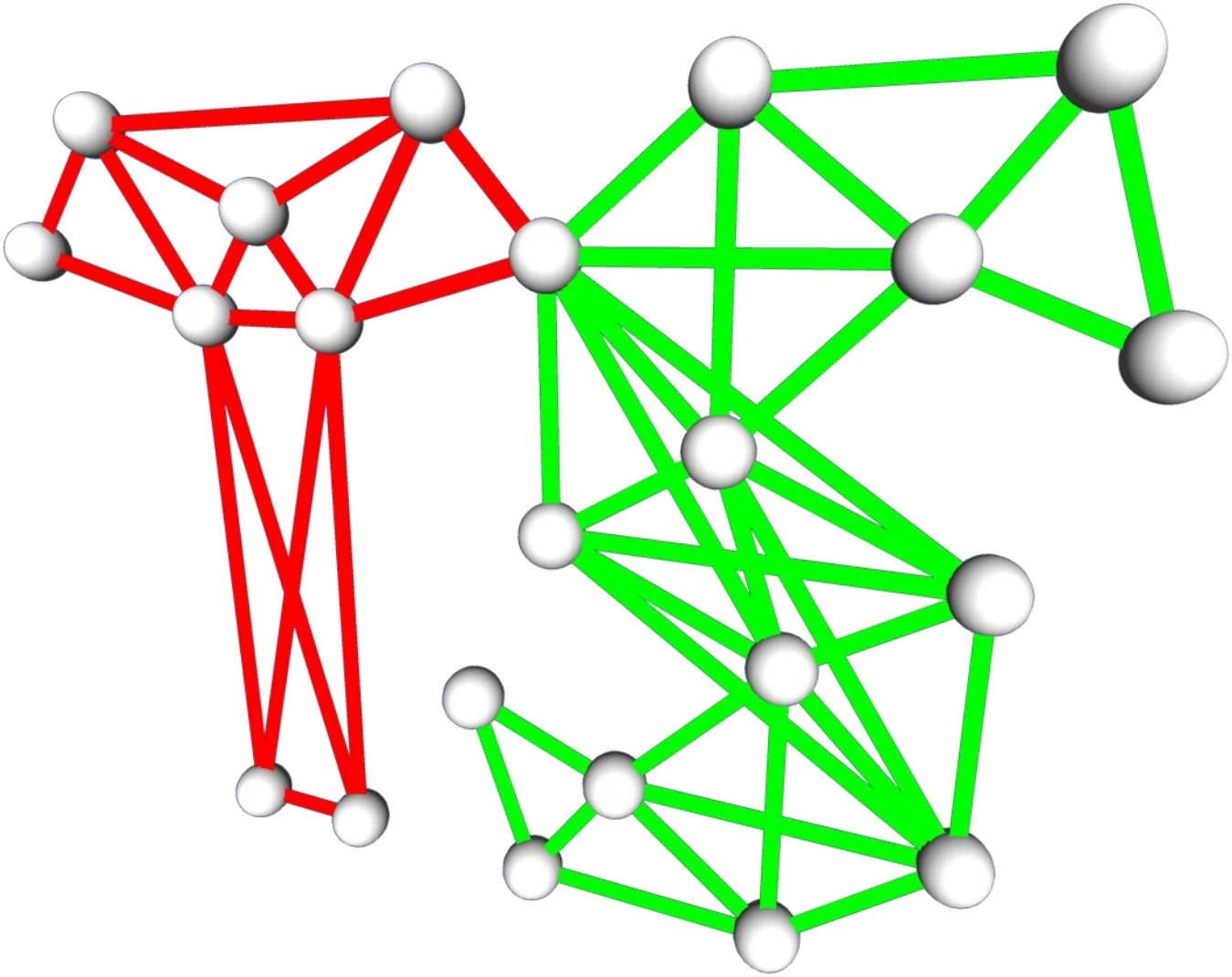


TradeSys

A trading and manufacturing system

V2.10

Contents

1 About

WARNING:

- TradeSys 2.8 and onwards requires one of my other packages, TagManagement to be in your project. This package is free and can be found here.
- Updating to 2.8 will reset the amount of money each trade post and trader has. This is due to a new currency system being used which allows for multiple currencies to be defined.

TradeSys is a trading and manufacturing system, but is capable of much more than this! TradeSys keeps track of all items in your game which can be bought, sold, collected and consumed. This means that TradeSys could be considered a monetisation system and a part of an inventory system.

TradeSys 2.0 brings new features, massive performance improvements and more possibilities to the market. This new version has been created from scratch, with all of the code being rewritten in an attempt to squeeze every last drop of performance out of the system. As a result, TradeSys can have a huge impact on the gameplay without having huge performance costs. The rewrite will also allow for many more new and exciting features to be added which simply weren't possible with the last version. This version is also more suitable for mobile platforms due to the performance benefits.

The editor interfaces for TradeSys have once again received a UI update. This makes set up even easier, allows better organisation of goods and manufacturing, and more possibilities thanks to more options being open for you to tweak! In addition, the majority of the different options now have tooltips to explain how each option affects TradeSys.

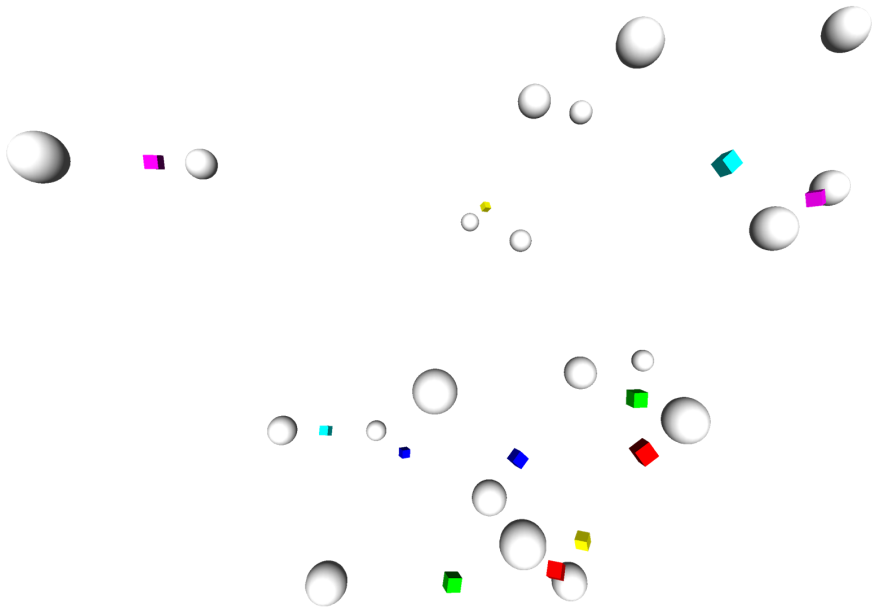
TradeSys 2.x has many new features but if you have any suggestions for new features or improvements or have any problems, please feel free to contact me at: pryercj@outlook.com

Thank you for using TradeSys!

1 About

P.S. I am excited to see your creations which use any version of TradeSys, so feel free to contact me using the email address above to show off your game, or post in the **TradeSys forum**!

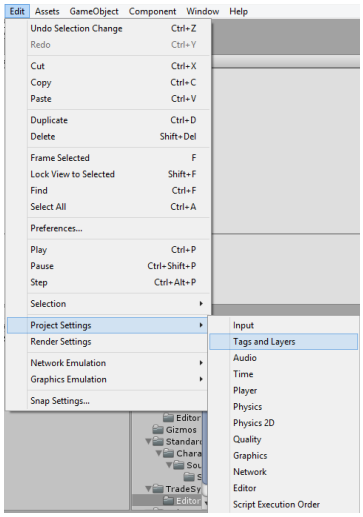
If you have purchased or updated to TradeSys 2.x but require some of the features which are not yet available, contact me on the email address with your invoice number and I will send you the latest 1.x version.



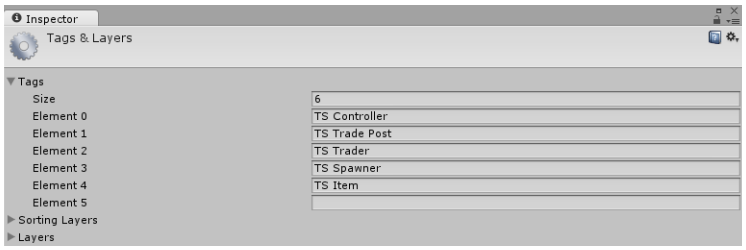
2 Controller

The first thing to do to get TradeSys to work is to add the correct tags. Without the tags being added, it is not possible to add the Controller script or to get TradeSys to work.

In order to add new tags, go to Edit > Project Settings > Tags (Tags & Layers in later Unity versions)

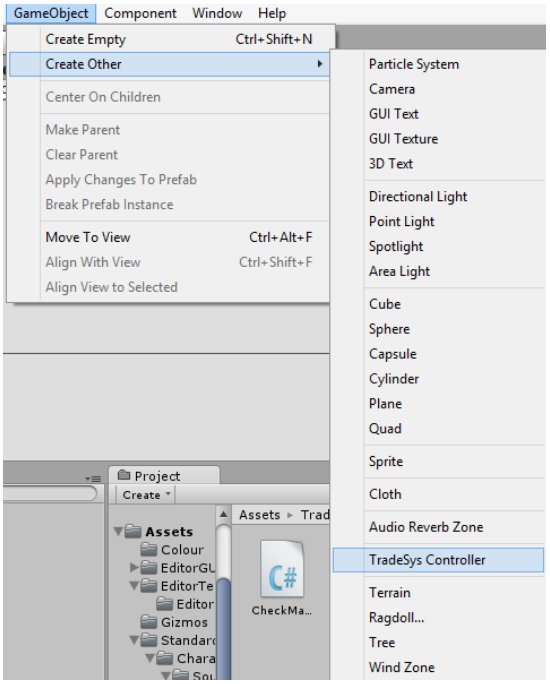


Here you can add the new tags. The tags are case sensitive and need to be called:



- TS Controller
- TS Trade Post
- TS Trader
- TS Spawner
- TS Item

Once they have been added, if you go to GameObject > Create Other > TradeSys Controller, it is no longer greyed out. Click this, and a new GameObject called _TS Controller will be added where you can set up all of the data for TradeSys. Everything is grouped into different sections, available from the toolbar.



The following pages will explain each tab.

2.1 Controller - Settings

The settings tab contains everything which can affect how trades occur using TradeSys. Each one of the options is in a collapsible group. The following pages explain each in more detail.

General options do not affect the trades, but affect how things are shown in the editor.

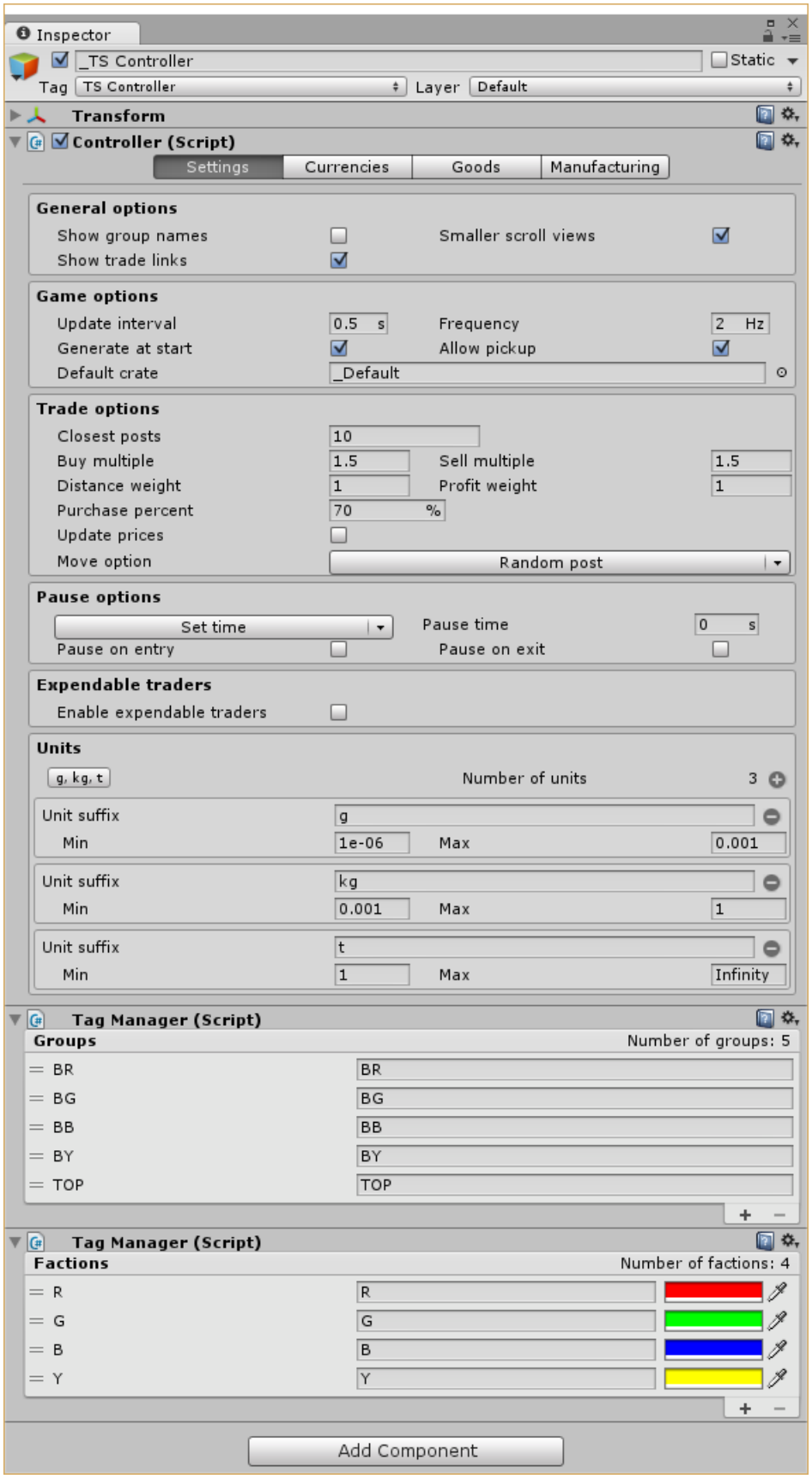
Game options change how TradeSys initially works.

Trade options affect the number of trades and how the best trade is selected.

Pause Options allow you to change for how long and when a trader will pause.

Expendable Traders are traders which will be created at a post and sent to another where, upon arrival, will be destroyed.

Units have some sort of unit after the mass of each cargo item.



Groups and factions are added automatically using the TagManagement package.

Groups limit where traders are allowed to go. Traders can only trade between posts if the trade posts are in the same group.

Factions limit which trade posts are allowed to trade with each other and which traders are able to make the trades. Traders can only trade with a post if they are in the same faction.

2.1 Controller - Settings

General Options

- Show group names: In the manufacturing item lists, show which group the item belongs to. Useful if two or more items share the same name
- Smaller scroll views: Keep a toolbar and other information at the top and everything else in a scroll view
- Show trade links: Show all of the possible trade links in the scene view. The colours of the lines indicate the factions

Game Options

- Update interval & frequency: Change how often TradeSys checks for possible trades. Reduce the frequency or increase the time interval to improve performance
- Generate at start: If you are creating the trade posts via code, disable this option and call `GenerateDistances()` in the controller. If the trade posts are defined in the scene view and are not dynamically created, select this option. This is so that TradeSys can generate the post distances matrix that is used in determining trades
- Allow pickup: This will allow you to set the GameObject prefab crates for each item and allow the collection of dropped items. This will also display the option discussed below
- Default crate: If you don't select a prefab crate for an item, this is the crate which will be used instead

Trade Options

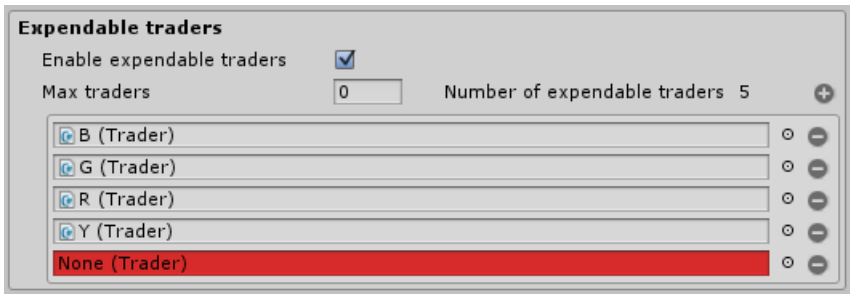
- Closest posts: Select how many of the closest posts traders check to determine the best post to trade with or to move to. Set this to 0 so that all of the trade posts are checked. See tips for performance information
- Buy multiple: If the quantity of an item that the trade post has multiplied by this value is less than the average number for that item, a trade post will want to buy that item
- Sell multiple: If the average quantity of an item multiplied by this value is greater than the number that the trade post has, then the trade post will want to sell this item
- Distance & profit weights: Use these to affect where the trader views as the best trade. Profit has a positive impact while distance is negative. Expendable traders being enabled will hide the profit weight
- Purchase percent: The percentage of the selling price that a trade post is willing to purchase items at
- Update prices: Update the price of an item each time a trader buys a single unit of the item
- Move option: Select what a trader does when there are no trades available at the current trade post. Processing power theoretically increases down the list.
    - Random: Will go to a random post which the trader can get to
    - Items per distance: Will go to the reachable post which has the highest value when the number of items that the post wants to sell is divided by the distance to that post
    - Best trade: The best trade to every reachable trade post is calculated and the trader will go to the trade post which has the very best trade

2.1 Controller - Settings

Pause Options

- Dropdown options:
  - Set time: All traders will pause for the specified time
  - Trader specific: The trader will pause for the time specified on each trader
  - Cargo mass: For each mass unit traded, the trader will pause for this length of time
  - Cargo mass specific: For each mass unit traded, the trader will pause for this length of time. Each type of good has a different time specified in each good
- Pause on entry / exit: Pause when a trader enters or exits a trade post for the required length of time

Expendable Traders



If enabled, any standalone traders will not work. Set the maximum number of expendable traders to have in a scene at once. Set this to 0 for infinite, and add prefabs of traders. These will be the traders that can be selected by TradeSys to use. The trader will be created at a post, unload the items and then be destroyed when it gets there. This does not involve the use of credits, so any options involving credits will be hidden.

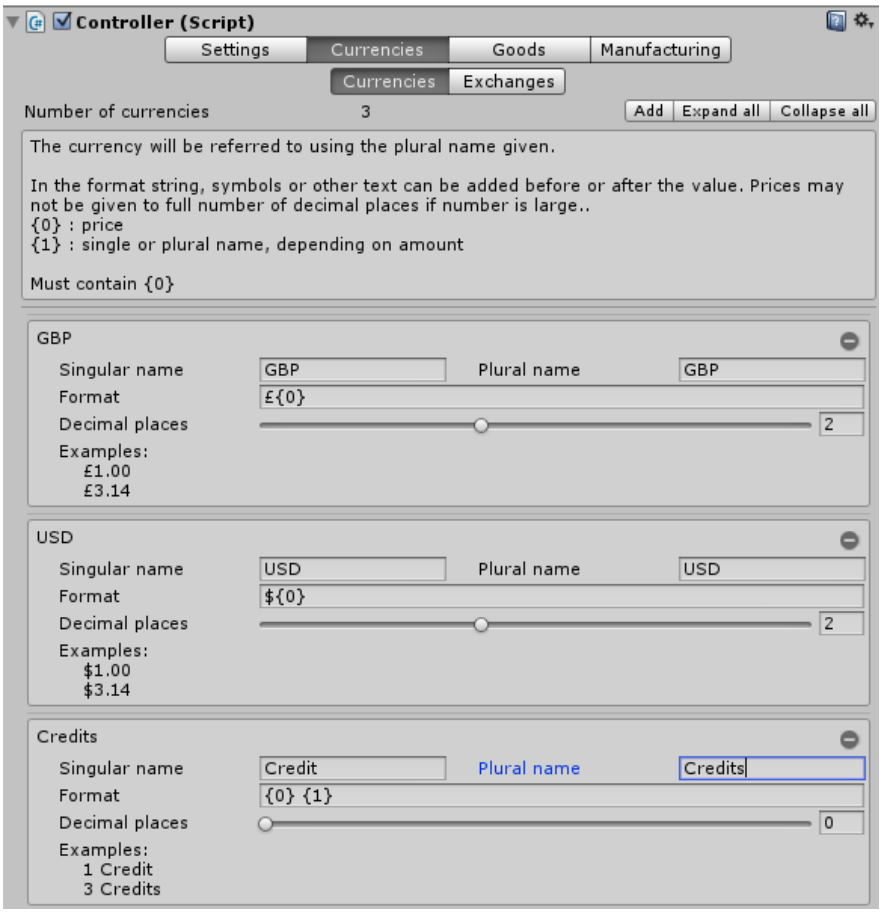
Units

Click the g, kg, t button to get the units to be set up as displayed in the screenshot. This button is available because these units are probably the most likely to be used units.

- Unit suffix: The ending of the unit that will be displayed e.g. 1 t
- Min: The minimum mass that the unit will be applied to. This will be equal to the maximum mass of the previous item
- Max: The maximum mass that the unit will be applied to

2.2 Controller - Currencies

The currencies tab allows multiple currencies that will be used for trading and exchange rates between them. Exchanges do not occur automatically and currently require your own code to do this.



Currencies

Here the currencies are defined. The singular and plural names that are used depending on the number of the currency.

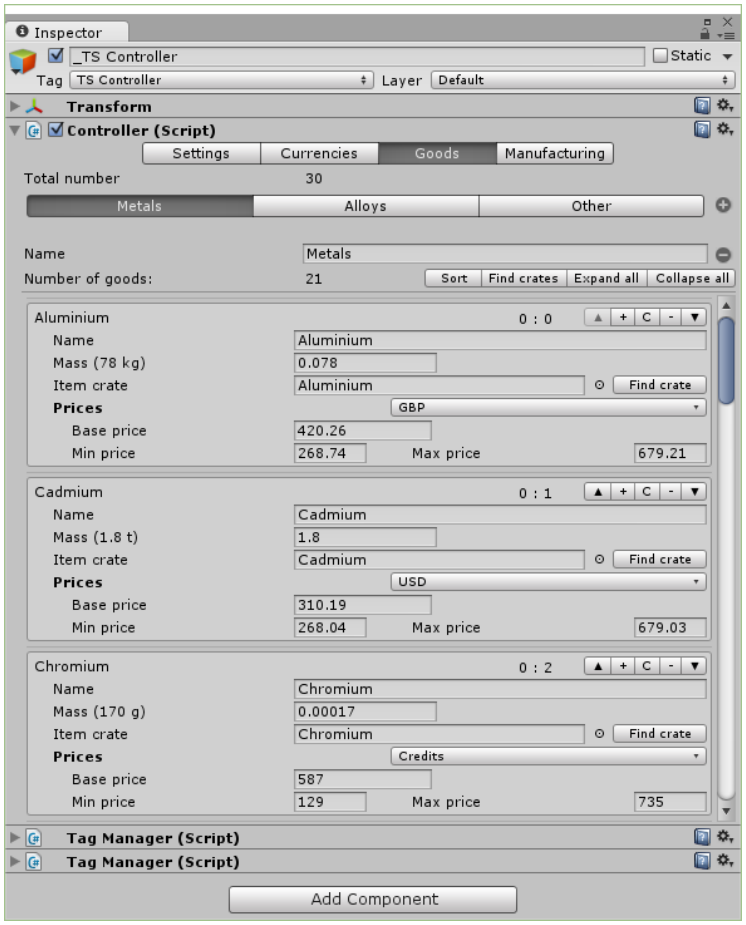
Format: alters how the currency name is displayed, allowing more options for display, such as a currency symbol before the value.

Decimal places: the number of decimal places to display the currency to.

The examples are shown so you can see how the currency values will be displayed.

The exchanges tab allows the exchanges to be defined. Press the plus button to add an exchange. The dropdown allows the currency to be selected and the conversion numbers for each can be set. Ticking the checkbox allows the conversion in reverse, and the arrow will update to become double ended.

2.3 Controller - Goods



Now it's time to set up the most important part of TradeSys: the goods which can be traded!

The total number shows the number of items over all of the groups.

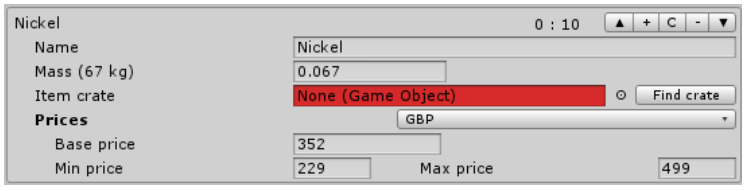
Groups can be added to help separate your items and make them easier to sort.

The number shows the number in the selected group.

Click the add group button to add your first good.

Options:

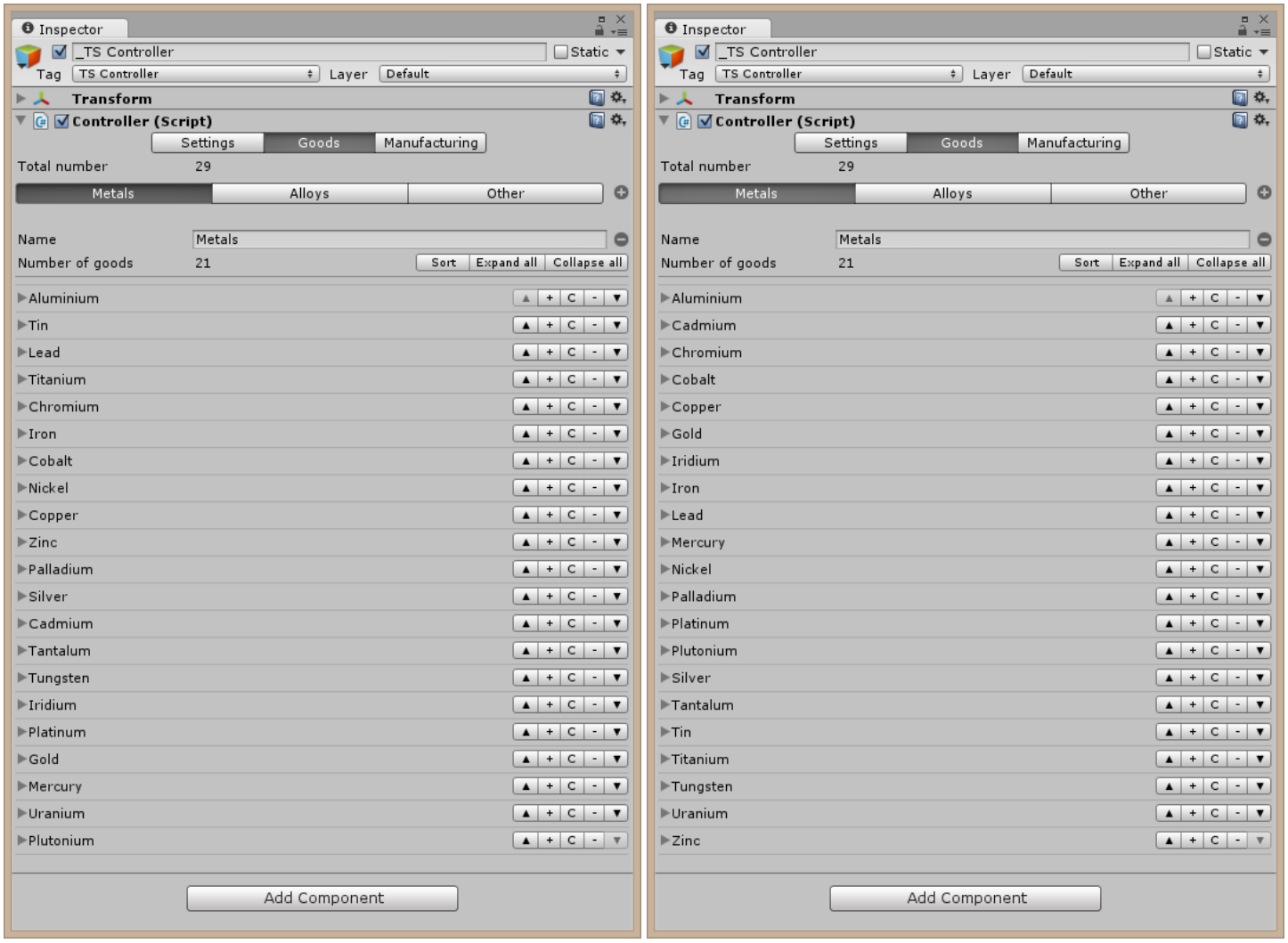
- Name: The name of the good
- Mass: The mass of the good. This is used to limit the quantity that a trader can carry. The mass is also displayed in brackets with the correct unit applied. The mass of an item with the correct unit is found in a variable called unit for each item, as this is calculated and sorted automatically by TradeSys
- Pause time: This will be displayed if the pause option is cargo mass specific and allows you to set how long to pause per item
- Item crate: This will be displayed if allow pickup has been enabled. It allows you to select an crate for the item. The find crate button will locate a prefab in Resources/Group Name with the same name as the item



- Prices (having expendable traders enabled will hide these options). The currency drop down allows the selection of the currency the item is traded in.
  - Base price: The price that a trade post sets the item prices against. This will be the price if a trade post has the average quantity of the item
  - Min & max prices: In calculating the prices of an item, if the price is outside these limits, the price will be set to the limit

2.3 Controller - Goods

TradeSys 2 now allows you to sort the goods alphabetically, so the goods can be added in any order and then sorted with ease. Simply press the sort button found at the top of each group.



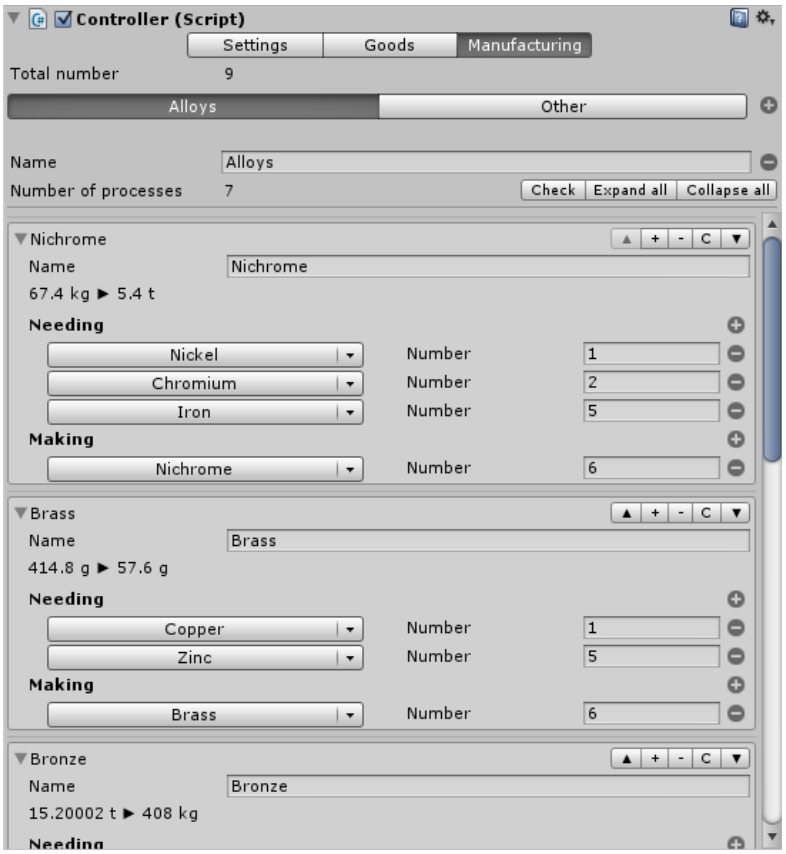
The expand and collapse all buttons mean that it is easier to view or hide all of the information for all of the goods at once.

On each good is a set of 5 options.

- Up / down arrows: Move the current good up or down one in the list
- +: Add in a new blank good after the current good
- C: Duplicate the current good. The copy is placed after the current good
- -: Delete the current good

2.4 Controller - Manufacturing

Another main aspect of TradeSys is manufacturing. This section will explain the options available.



Total number shows the total number of manufacturing processes that have been created.

Groups can be added to separate the different sets of processes. This could be useful if a certain type of machinery allows the use of different manufacturing processes as you could have all of the processes that it does in one group.

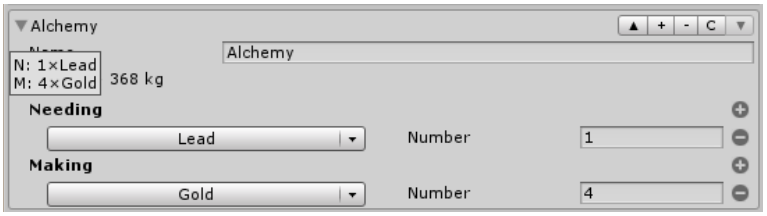
Number of processes shows the number in the current group.

Click the add process button to add the first process.

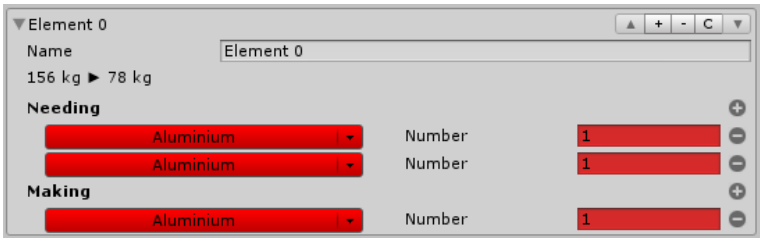
Options:

- Name: The name of the process.
  Once set up, whenever there is manufacturing processes, hovering over the name will show information about what is needed and what is made as can be seen in the image below
- Needing / making: Select which items are needed or made in each process. This could be left blank to create a source or a sink of items
  - Dropdown options: Contains all of the different goods that have been set up
  - Number: The number that are needed or made by the process

Below the name of each item is information displaying the input mass and the output mass, which could be used to help make it more realistic so that 1g of an item isn't made into 1t of another.



2.4 Controller - Manufacturing

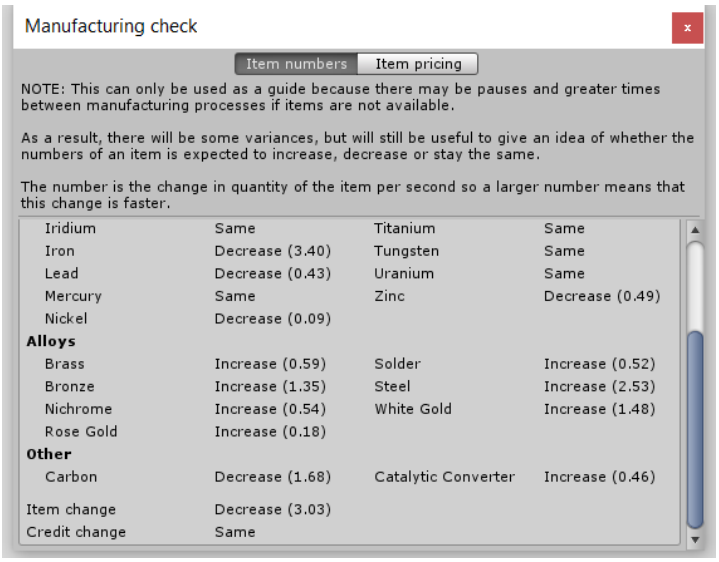


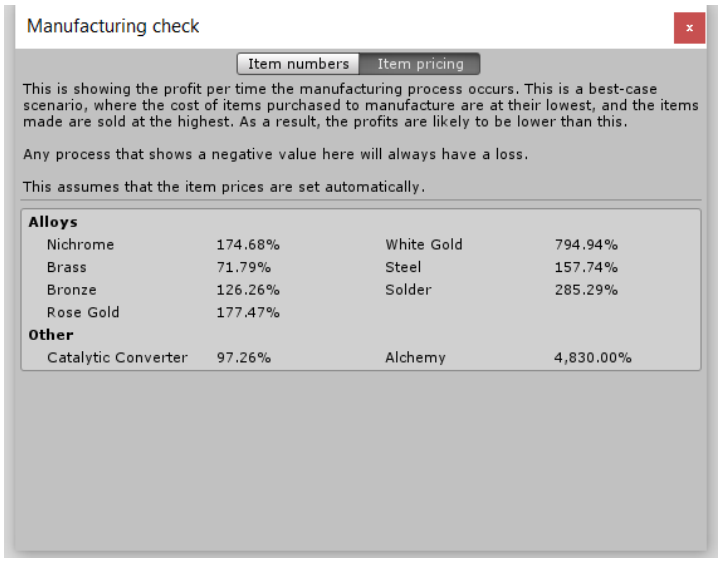
If you have a good repeated in a manufacturing process, it will be highlighted in red to make it more obvious as most of the time, this is a mistake. If you have deleted a good which the process uses, it too will be highlighted red.

On each process is a set of 5 options.

- Up / down arrows: Move the current process up or down one in the list
- +: Add in a new blank process after the current process
- C: Duplicate the current process. The copy is placed after the current process
- -: Delete the current process

At the top of each group is a set of 3 options. The expand and collapse all buttons mean that it is easier to view or hide all of the information for all of the goods at once.

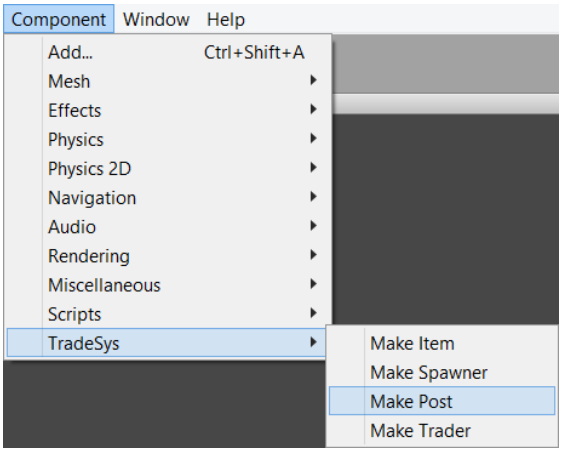




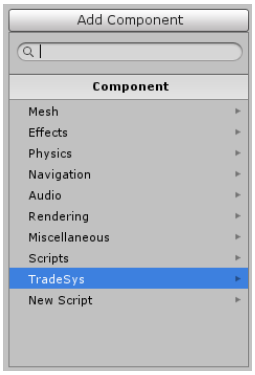
The check button will make TradeSys calculate whether the number of an item will increase, decrease or stay the same, depending on the creations and cooldown times set up at each trade post. Also calculated is the percentage profit that each process may make. For this to display correctly, currency exchanges are required to be set up so there is a direct link to a single, common currency. This is a best case scenario, and so it is likely to be less than displayed. If a process is showing a negative value, the process will never be profitable. This window will update if you make a change and then click back onto it, making it easy to instantly see what effects your changes have. If expendable traders is enabled, item pricing will not be shown.

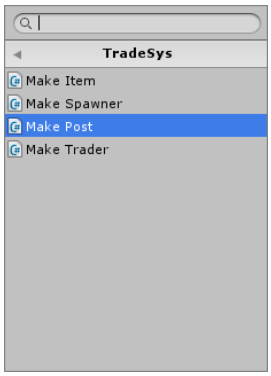
3 Trade Post

Adding trade posts can be done in one of two ways. One is by specifically creating them and the other is by using a script to create them. Here, creating the trade posts by adding them to the scene will be explained.



First, select a GameObject. Then go to Component / Add component > TradeSys > Make Post





The options and the number seen on the Trade Post editor will depend on what has been set up in the controller. For example, if factions have been disabled, the option to select factions at the trade post will not be displayed.

The show items vertically or horizontally options are to change how everything is displayed. This is so you can change the option to however you prefer to see the goods etc. displayed in the editor.

Options

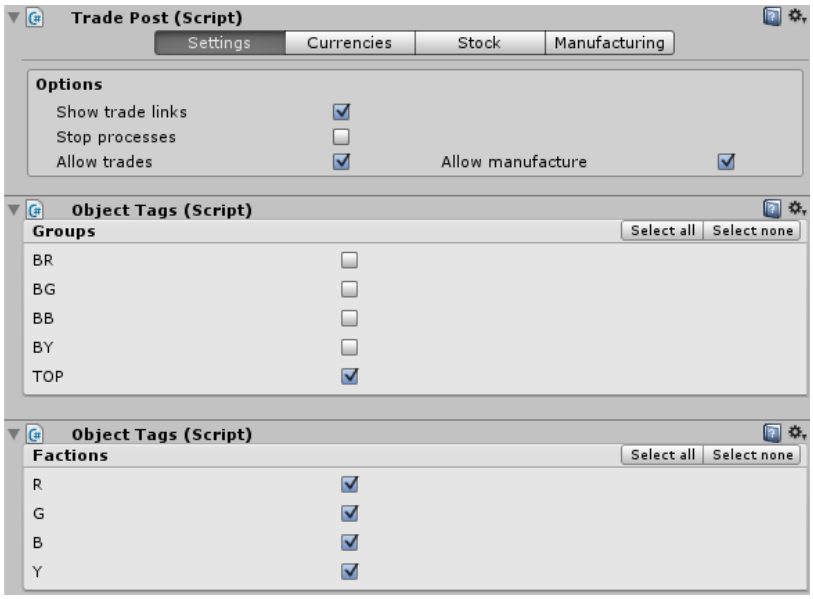
- Show trade links: Show lines connecting the trade posts which are allowed to trade with each other in the scene view
- Custom pricing: Instead of having TradeSys automatically setting the prices at the trade post, have these set to specific values
- Stop processes: If number limits for goods have been selected (See stock) , and if a manufacturing process will result in the number of a good going beyond this limit, the manufacturing process will be stopped until the quantities go to the acceptable range
- Allow trades/manufacture: If enabled, the controller will be able to trade items or manufacture items. When disabled, will allow the item numbers to be set in the stock tab so it can be enabled at a later time

3.1 Trade Post - Groups & Factions

Groups and factions are handled by an ObjectTags component which will automatically be added to any Trade Post.

Groups

Select which groups the trade post belongs to. This needs to be set up in the controller. Select the show trade links option at the top to be able to view which trade posts it can trade with in the scene view.

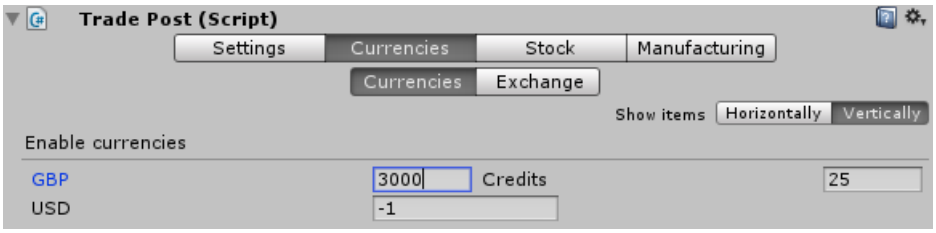


Factions

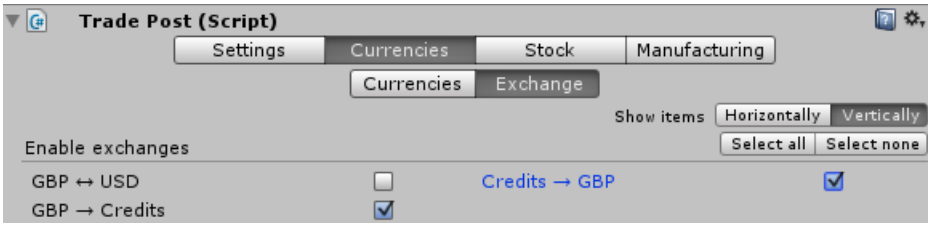
Select which factions the trade post belongs to. This also needs to be set up in the controller. Select the show trade links option at the top to be able to view which trade posts it can trade with in the scene view. Factions also mean that the trade post can only trade with traders which have at least one mutual faction.

3.2 Trade Post - Currencies

The currencies and amount of each that are used within trades at the trade post need to be set. Enter the amount that the trade post has. If this is set to –1, the currency will be disabled and any items that use that currency are not allowed for trade.



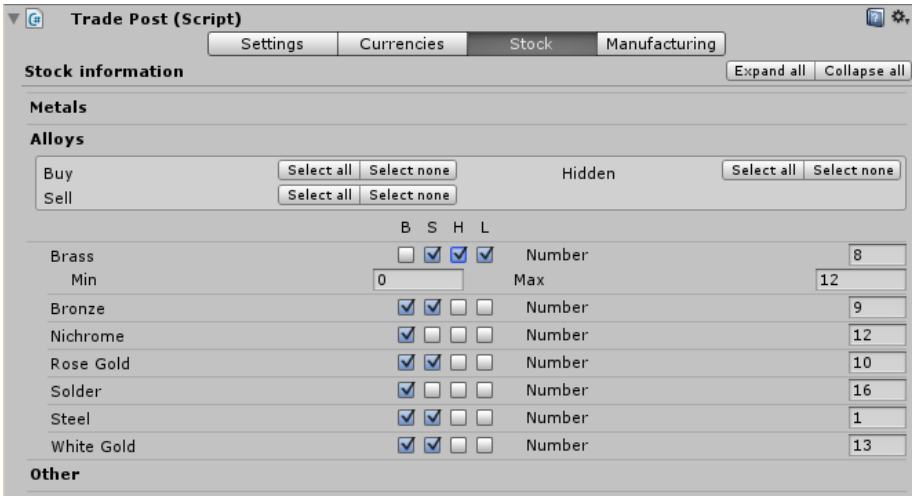
The exchanges can be selected if they are allowed or not. In 2.8, exchanges have no effect.



3.3 Trade Post - Stock

The next step in setting up TradeSys is setting the stock information, found under the stock tab.

Click on the group name (in bold) to hide or show the goods belonging to it.



Buy (B)

Select whether the trade post is allowed to buy the item

Sell (S)

Select whether the trade post can sell the item

Hidden (H)

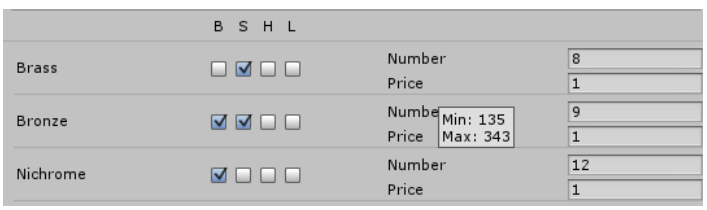
If selected, it means that if the item has not been allowed to be bought or sold at the trade post, it is hidden, allowing it to be created or used within manufacturing processes. For example, one process creates that item while another then uses it to create something which can then be sold.

By selecting one of the above options, the item is enabled at the trade post. This will allow you to select the starting number and apply any limits

Limits (L)

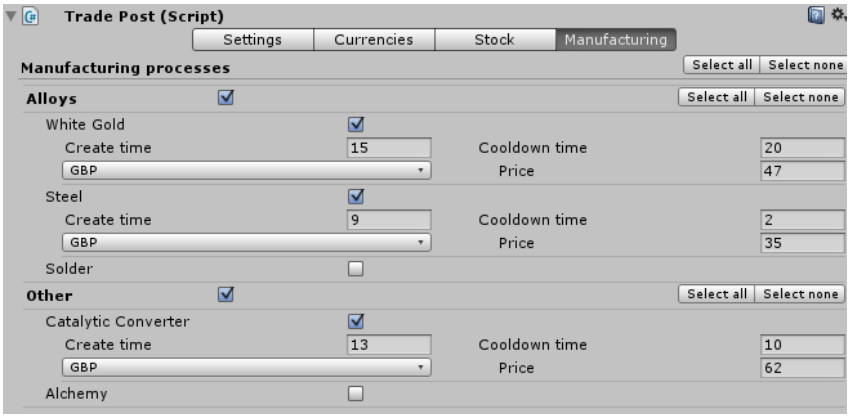
If selected, two more options will be shown to set the minimum and maximum number that the post should aim to have. If stop processes has been selected in the settings tab, then any processes which will take the quantity beyond these limits will be paused until it will not.

If custom pricing has been selected in the settings tab, then another option will appear for each good which will be the price. By selecting this option, the prices of items will not fluctuate as they will remain at this set price. If you hover over the price of the item, it will tell you the min and max prices that have been set up. No restrictions are placed on the pricing, but this makes it easier to compare with what the prices will be in game.



3.4 Trade Post - Manufacturing

Once the goods at the trade post have been sorted, it is time to sort out the manufacturing processes.



To enable a group, make sure it is ticked. To hide or show a process group once it has been enabled, click on the bold group name.

A manufacturing process will only appear if the correct buy / sell / hidden options have been selected. If these have not, then the post will not be able to follow the process. For any items in the needing list of a process, the item must be marked as buy or hidden while any items in the making list must be sell or hidden.

When you have enabled a process, extra options will be displayed.

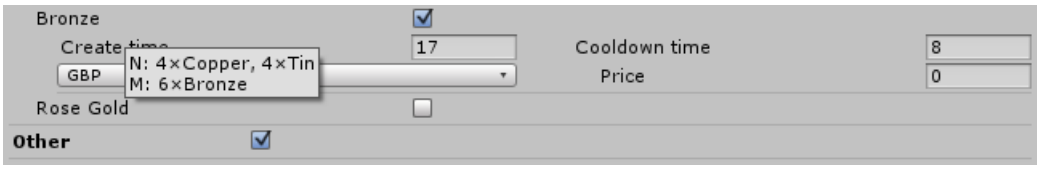
Create time: If there are enough of each item in the process, these items will be removed from sale, and manufactured. The create time is how long it is between the removal of the needed items and the production of the items to make.

Cooldown time: This is how long a process must wait after completion to be run again.

Currency: Select the currency that the price will be in.

Price: This is how much it costs the trade post to manufacture. If the value is negative, the post will receive money from manufacturing.

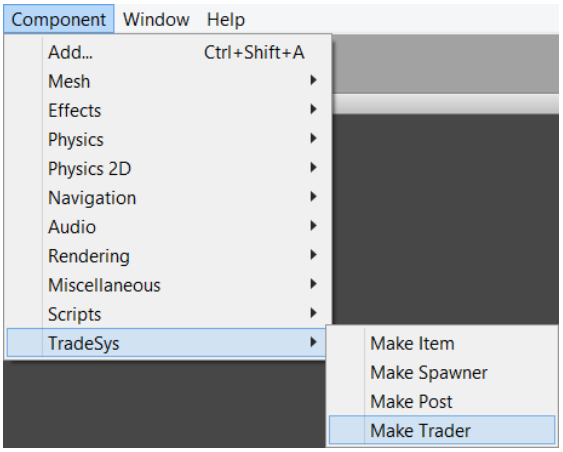
Hover over the name of the process to show what the process needs and makes.



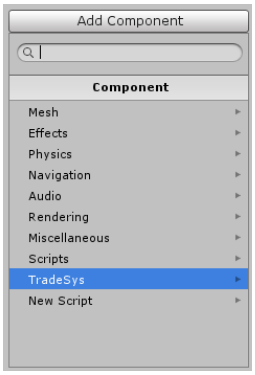
If the trade post has sufficient stock to manufacture, the items will be removed. It then pauses for the create time where the items are then made and the process will then pause for the cooldown time.

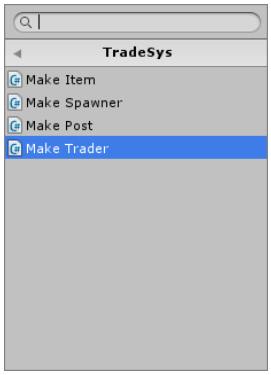
4 Trader

Adding traders can be done in one of two ways. One is by specifically creating them and the other is by using a script to create them. Here, creating the traders by adding them to the scene will be explained.



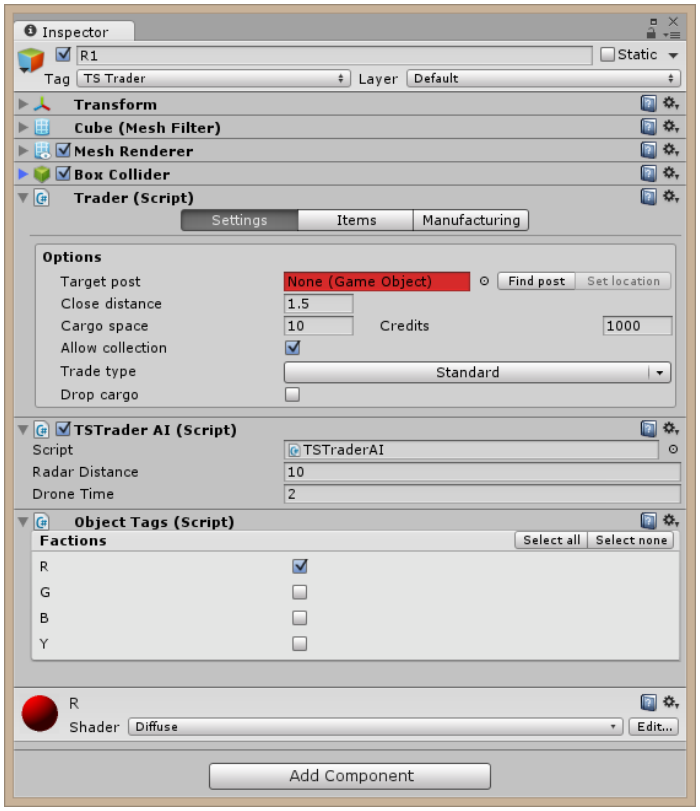
First, select a GameObject. Then go to Component / Add component > TradeSys > Make Trader

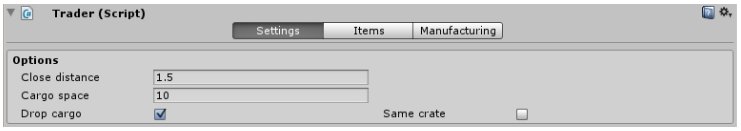




Options (Most of this group will be hidden if expendable traders have been enabled)

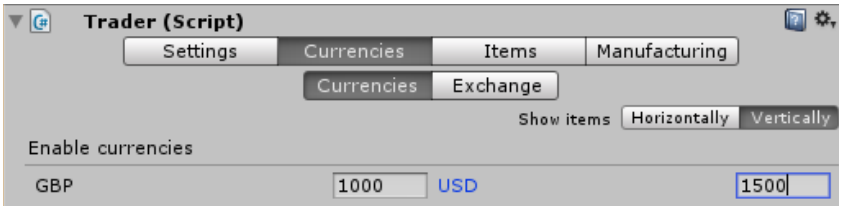
- Target Post: This is the starting post of the trader. At any other time, this will be the trade post that the trader is heading for. Press find post to automatically find a trade post within the close distance and move the trader to the correct location. Or, specify a location and then press set location to move the trader there
- Close distance: This is how near to a trade post the trader needs to be before it is registered as having arrived.
- Cargo space: The maximum mass of cargo that can be carried by the trader
- Credits: How much money the trader has which it can use to purchase goods to trade
- Allow collection: Shown if allow pickup is enabled in the controller. It allows the trader to pick up items
- Trade type: This is what the trader does. Standard means it will go anywhere making trades. The other two options are depots, where the trader will always return to the start post after making a trade. Backhaul means that if there is cargo going back to the home post, it will take it, no backhaul means that this does not happen.
- Drop cargo: If allow pickup is enabled, then when `DestroyTrader`, `DropAllCargo` or `DropCargo` is called, carried items will be dropped. If not selected and one of those methods are called, the items will be destroyed.
- Same crate: If drop cargo is enabled, will give the option to have multiple of a single item in one crate or for each individual item to be dropped separately



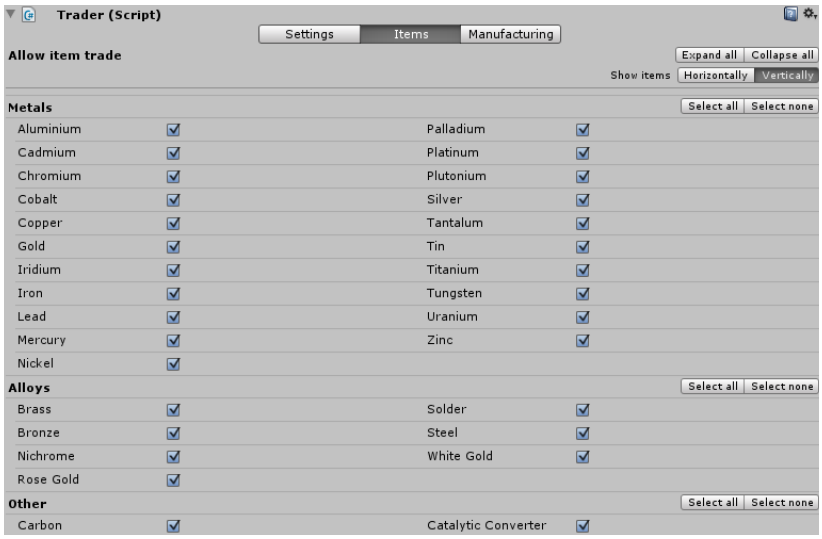


4.1 Trader - Other options

Currencies



This is set up in the same way as Trade Posts. If a trader does not have the currency enabled, it will not be able to trade any items that require the currency.



Items

The items tab allows you to select which items the trader is allowed to carry. This affects which manufacturing processes will show up in the manufacturing tab.

Manufacturing

Setting up manufacturing for traders is the same as it was for trade posts. The differences are that the trader must have enough cargo space, and the process will pause for the create time, take and create the items and then pause for the cooldown time. This is to ensure that items are not removed and in the manufacturing process when the trader is at a trade post.

Info

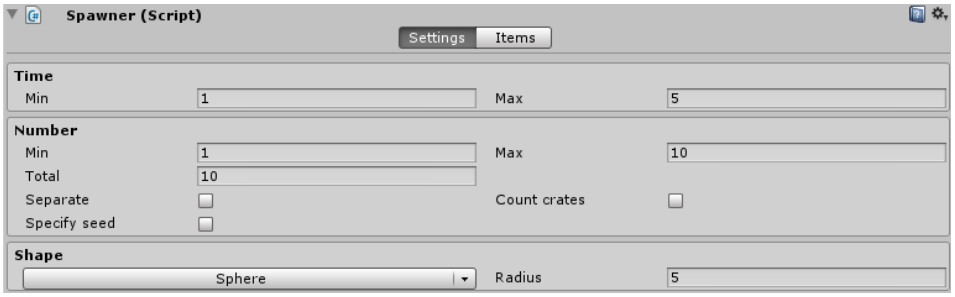
Since 2.3, the trader script no longer includes the code to make the trader move. Instead, all of the AI has been moved into a separate script called TSTraderAI found in the Examples folder. The trader will not do anything unless this script or a script of your own is added to the trader. The script is discussed in more detail on the relevant useful scripts page.

5 Spawner

Spawners will randomly create generate items which your traders or players can collect. To add a spawner, it is the same procedure as for trade posts and traders. Select a GameObject, then got to Component / Add component > TradeSys > Make Spawner

Time options

- Min / max: The minimum and maximum time between successive spawns



Number options

- Min / max: The minimum and maximum number of the item to spawn at once
- Total: The maximum total items to be at that spawner at once. Set this to 0 for it to be infinite
- Separate: If enabled, and is spawning more than one item, put each into a separate crate. If disabled, multiple items can fit into the one crate
- Count crates: If separate is disabled, then gives the option to count the number of crates towards the total or the number of items at the spawner
- Specify seed: If enabled, gives an option to specify the seed number used so that games are the same

Spawn options

The dropdown list consists of 4 areas: Sphere, Circle, Cube, and Square. This is the option for what area to spawn the items within. Each will have a radius or length option. Scaling the size of the spawner will also affect the spawn area, meaning for example rectangular spawn areas are possible. The trader collect option allows or disallows traders from collecting any of the items that are spawned at this spawner

Items

Select what items it is that the spawner is allowed to create. Is the same options as for selecting which items a trader can carry.

6 Item

TradeSys 2 allows for the creation of items. These are the same as the items that are spawned, but where you have the object already in the scene, so can set them to be at a specific location.

To add, Select a GameObject, then got to Component / Add component > TradeSys > Make Item. Or if you have item crate prefabs used for spawners, drag one of the prefabs into the scene.

Dropdown: allows you to select what type good the crate is. If show group names has been selected in the controller, this will show the group name too.

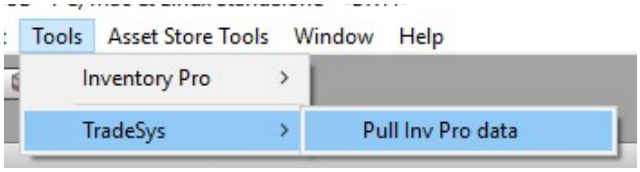
Number: the number of this item inside the crate

Trader collect: select this if you want to make it possible for other traders to collect this item

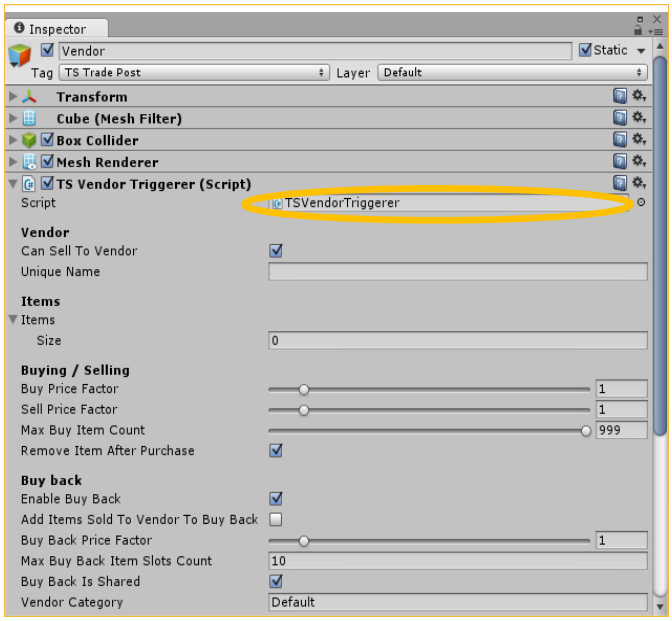
7 Inventory Pro support

TradeSys is now able to support Inventory Pro. In order to do this, ensure that the correct tags have been added and Inventory Pro has been set up. Set all of the items and information in Inventory Pro initially, TradeSys will gather the data that it requires from the database.

1. Open InvPro, a unity package located in the TradeSys folder.
2. Add a controller to the scene.
3. Go to Tools > TradeSys > Pull Inv Pro data. This will add the information to the TradeSys controller. Item pricing can be customised and edited at this stage, TradeSys will manage all pricing.



4. On each Inventory Pro vendor, make the vendor a trade post, as would do normally (Component > CallumP > TradeSys > Make Post). Change the VendorTriggerer script attached to be TSVendorTriggerer. This should not modify any details or information that has previously been set. Set the items to sell and item numbers using Inventory Pro. At the start of the game, each trade post will get the number of each item and sort the prices.



5. Set the trade post up with the number of each currency in the trade post component. The TSVendorTriggerer is capable of ensuring that the posts/vendors are capable of purchasing items back from traders, something that is not currently available in Inventory Pro. Manufacturing can also be set up as the post will se the number of items that should be available when required.

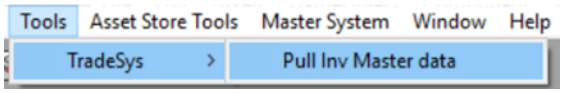
Notes:

- The player does not need to have the TradeSys player script as the items carried etc. is handled by Inventory Pro.
- It is not possible to select what items can and cannot be traded at a trade post.
- The ability to sell items back has not been tested, but should function correctly.
- This has been tested on Inventory Pro 2.4.1

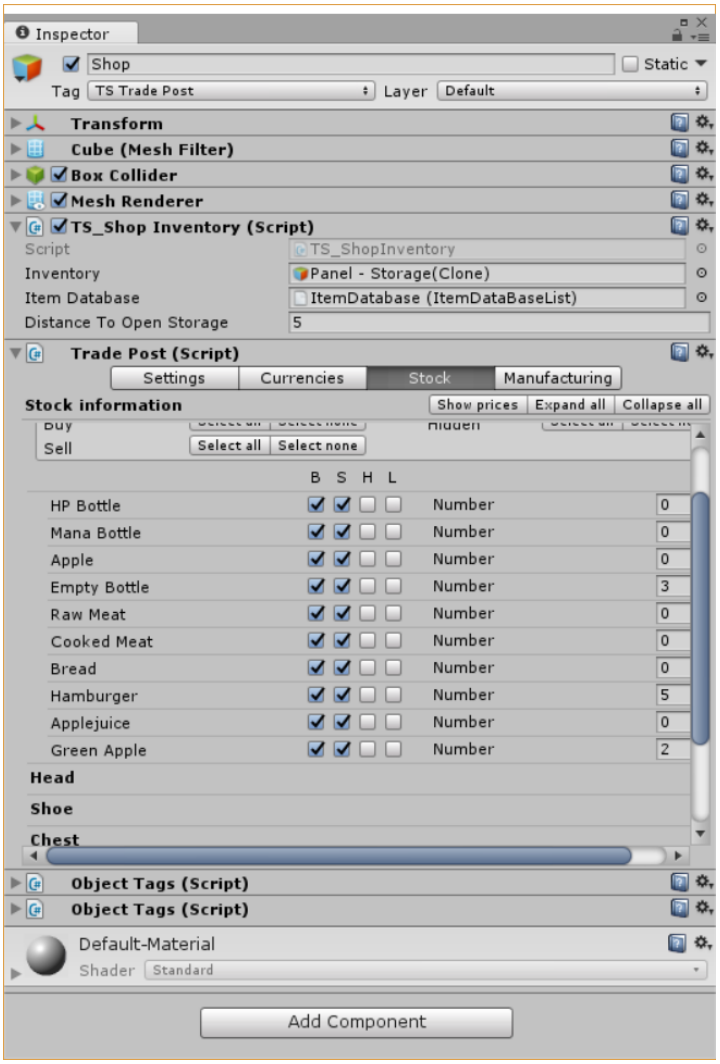
8 Inventory Master support

TradeSys is now able to support Inventory Master. In order to do this, ensure that the correct tags have been added and Inventory Master has been set up. Set all of the items and information in Inventory Master. Initially, TradeSys will gather the data that it requires from the database.

1. Open InvMaster, a unity package located in the TradeSys folder.
2. Add a controller to the scene.
3. Go to Tools > TradeSys > Pull Inv Master data. This will add the information to the TradeSys controller.



4. To add a shop, add TS_ShopInventory to the GameObject. This will add a script similar to the storage script from Inventory Master. Set the Inventory variable to the UI panel (I have used the same as storage). Set the item database. The TradeSys trade post will have all the correct information.



5. Add the stock numbers in the trade post script. This information will be gathered when the player is at a trade post and then sent back after leaving.
6. Trade posts and traders have to be given an amount of currency in order to be able to trade. The costs are not seen by the player but could still be applied to traders.

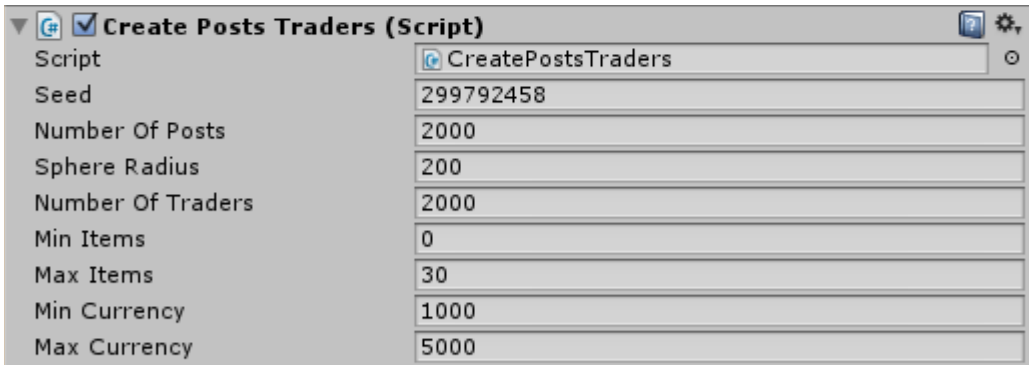
Notes:

- The player does not need to have the TradeSys player script as the items carried etc. is handled by Inventory Master.
- It is not possible to select what items can and cannot be traded at a trade post.
- Item pricing is not seen by the player as a currency system is not built into Inventory Master.
- This has been tested on Inventory Master 4.6.1.

9.1 Useful scripts - CreatePostsTraders

CreatePostsTraders is a script which will create trade posts and traders by code. A demo of its use can be found in the scene called autogen This script is located under the main camera.

This can be used as a basis to create your trade posts and traders if you wish to do so via code. It will need editing because currently it will create spheres for the trade posts and cubes for the traders. When you add this script or a similar script to create the trade posts, you will need to disable the generate at start option found in controller settings under game options. Empty GameObjects called “Posts” and “Traders” also need to be created as these are the parents for any generated. The options available from this script are detailed below.



Seed: This is the seed number used to create the posts and traders. It is specified so that it will not change the trade post locations

Number of Posts: The number of trade posts to be generated

Sphere radius: The radius of the sphere in which all of the trade posts will be created

Number of Traders: The number of traders to be generated

Min/Max: The minimum/maximum number of each item a trade post can start with

NOTE: The script no longer randomly selects groups and/or factions to be selected

9.2 Useful scripts - Player

A simple player script is also included in TradeSys. The use of this script can be found in the scene called player.

This is designed to provide a basic demo of how to include a player in your game. It is mainly designed to show you how to get the different variables that you may require in creating a shop UI, and to show how making purchases and sales may occur. Like all of the other included scripts, it is fully commented to help understand what the code is doing.

The example scene has an ObjectTags component added to the player. This has been set to factions and is linked with the script as the script will prevent the player from trading with a trade post where there are no mutual factions. This can be seen at the orange trade post.

The trade posts in the scene have another ObjectTags component which is called Post tags. This is used in a way where different posts can do different things. In the player scene, the magenta trade post is an estate agent, allowing you to purchase any of the coloured trade posts. This is using a post tag for the estate agent, another for the owned posts and a further one for purchasable posts.

In addition to post tags, use of the goods and manufacture groups has been included. The trade post opposite any where you can purchase items sells another item named smelter. If you purchase this, and go to an owned trade post, the player script has code which will allow you to fit this to the trade post, and enables the manufacturing process group called alloys.

Note: items will not be manufactured as it only enables the group, further code is required to allow selection and enabling of the individual processes.

There is a spawner located in the middle of the scene where you can collect items, and traders will do the same too. Behind the magenta estate agent is a collection of 5 items. These are collectible and are there to demonstrate that TradeSys 2 allows for special items to be placed for collection in certain locations.

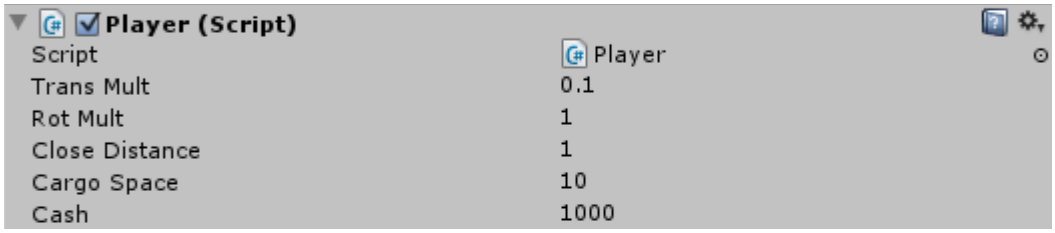
Trans Mult: The multiplier used for translating the player

Rot Mult: The multiplier used for rotating the player

Close Distance: How close the player needs to be to the trade post in order for it to count as being there

Cargo Space: The maximum amount of cargo that can be carried by the player

Cash: The amount of cash that the player has to make trades



9.3 Useful scripts - TSTraderAI

Since 2.3, the AI code for having the traders move has been moved into this separate script.

Almost every line is commented to help you in creating your own AI, and any important methods which need to be called in order to make TradeSys work are marked. It is a really basic script which should be expanded upon for use in a game.

Radar distance: This is the distance that a trader can 'see' items. It is only used when allow pickup has been enabled in the controller as this is used to find what items are in radar distance.

Drone time: How long the trader should stay still for while collecting an item.

10.1 Useful methods - Controller

`void GenerateDistances()`

If you are using a script to create all of the traders and trade posts, this script needs to be called. TradeSys now works by calculating the distances at the start. This is why there may be a delay before starting a game. However, as the distances only have to be generated once and everything from that point is then found in the distances matrix, TradeSys is a lot faster. Call this method later if you have made any changes to the trade posts found or the factions and groups. Doing this however may temporarily freeze the game while the new matrix is calculated.

`void EditProcess(List<MnfctrGroup> manufacture, int manufactureGroup, int processNumber, bool enabled, int createTime, int cooldownTime, int price)`

OR

`void TradePost/Trader.EditProcess(int manufactureGroup, int processNumber, bool enabled, int createTime, int cooldownTime, int price)`

Edit the manufacturing process, enabling or disabling it or changing the create and cooldown times for traders or trade posts.

- `manufacture`: This is the manufacture list found in trade posts and traders
- `manufactureGroup`: The manufacture group the process belongs to
- `processNumber`: The number of the process in the manufacture group
- `enabled`: Set if the process is enabled or not
- `createTime`: How long it takes for the process to create everything in the making list
- `cooldownTime`: How long before the process is allowed to be run again
- `price`: How much the process costs to run. Set to be negative to receive money

`void AddPost(TradePost newPost)`

Call this after adding **every** new trade post, setting `newPost` to be the post that has just been created. This method will add the trade post to the game and calculate the distances required for TradeSys to work.

10.1 Useful methods - Controller

`TradePost PostBuyNearest (TradePost currentPost, int groupID, int itemID)`

Find the nearest post to the current post that the particular item can be bought from.

`TradePost PostSellNearest (TradePost currentPost, int groupID, int itemID)`

Find the nearest post to the current post that the particular item can be sold to.

`TradePost PostBuyCheapest (TradePost currentPost, int groupID, int itemID)`

Find the post that the particular item can be bought for the cheapest price.

`TradePost PostSellExpensive (TradePost currentPost, int groupID, int itemID)`

Find the post that the particular item can be sold to for the highest price.

All of the above methods use the same definitions for the following:

- `currentPost:` The current post that the player is at
- `groupID & itemID:` The group number and item number of the particular good

`List<BuySell> PostWantBuySell (TradePost post, bool buySell)`

Get the list of items that the trade post wants to buy or sell. `BuySell` has variables `groupID` and `itemID` to specify the good.

- `post:` The trade post that the lists are to be found for
- `buySell:` True if the list of items the post wants to buy, false for items that want to be sold

10.2 Useful methods - Trade Post

`void UpdatePrices()`

When the player is in a trade post, the prices for items will need to be updated. TradeSys does not do this automatically because it would be updating the prices for some trade posts unnecessarily.

`void EnableDisableTradeMan(bool enableTrades, bool enableManufacture)`

Set whether a trade post is allowed to make any sort of trades or manufacture items. These will not appear in the editor so that if enabled, all items will keep their previous values.

`void AddRemoveGood(int groupID, int itemID, int number)`

Add or remove goods to the trade post stock using the groupID and itemID of the stock item.

`void EnableDisableStock(int groupID, int itemID, bool buy, bool sell, bool hidden)`

Change the buy, sell or hidden options for an item at a trade post. Hidden can only be enabled if buy and sell are both false.

`void MovedPost()`

Call this when you have moved the trade post. This is so that the distances can be updated efficiently

`void RemovePost()`

Call this in order to remove the post from the game. It calls `DeletePost()` which could be modified to use object pooling rather than the current `Destroy(gameObject)` method.

10.3 Useful methods - Trader

`void Trader.ChangeTraderHome(TradePost post)`

`void Trader.ChangeTraderHome(GameObject post)`

Either one of these is used to change the home post ID of the trader. It is only useful for expendable traders so you can change where they will return to.

`void DropCargo(int number, int groupID, int itemID)`

Drop the number of the current cargo specified. Will drop all items if this number is greater than the number carried.

`void DropAllCargo()`

Will drop all of the held cargo by calling `DropCargo`. If the drop cargo option is selected, will drop the cargo, if not, will destroy the cargo. Drop single will drop the items in separate item crates.

`void DestroyTrader()`

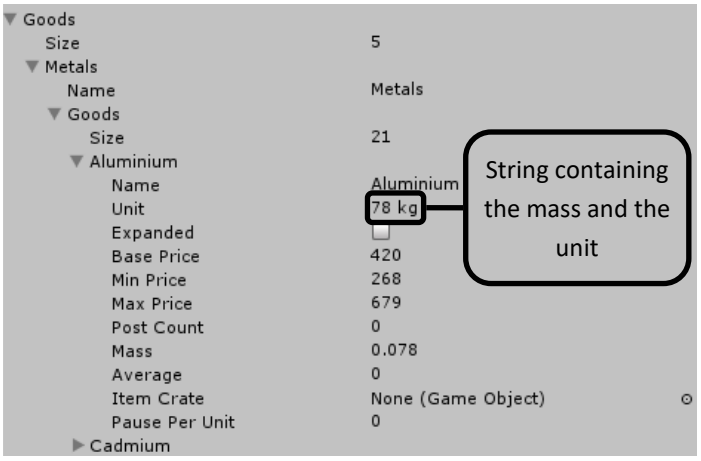
Destroy the current trader. Calls `DropAllCargo` and will then destroy the trader using `Destroy(gameObject)`

11 Useful variables

TradeSys 2.x now includes some extra details in variables instead of having to use different methods to get the data. These variables may not be obvious or used in the demo scenes or player script, so have been listed here for ease of use.

`string Controller.goods[int goodsGroup].goods[int itemNumber].unit`

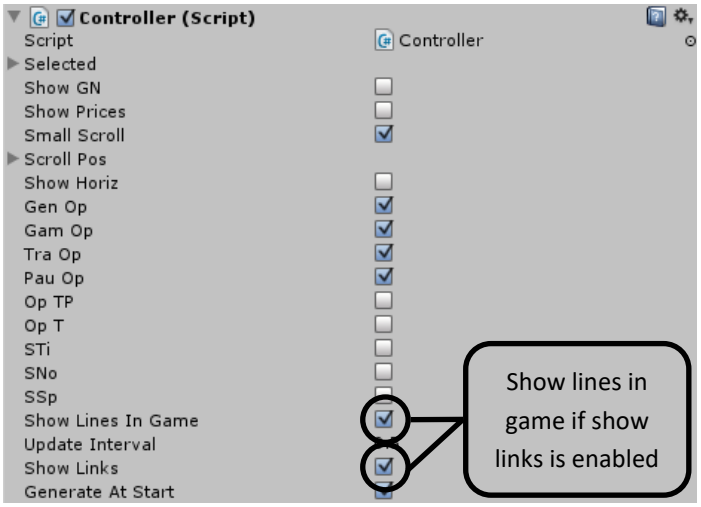
This will provide you with the string which contains the sorted mass and the correct unit, so will display as seen in the editors.



`bool Controller.showLinesInGame`

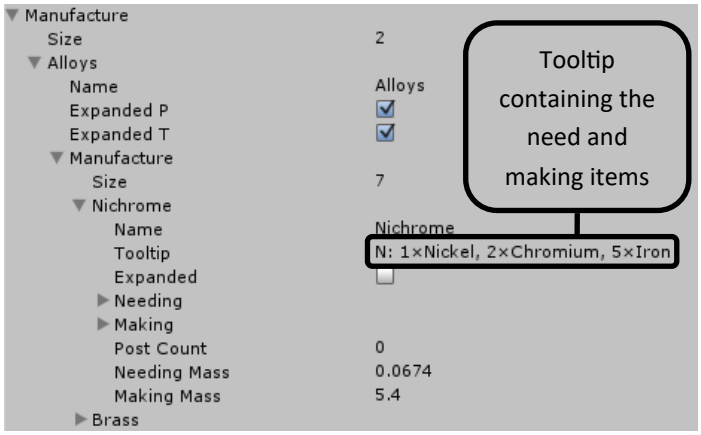
By setting this to true, the trade links will be displayed in the game view when the game is played. This can also be enabled by going into the debug menu of the inspector and selecting the option.

WARNING: If this is being tested in the editor, the game has been paused and show trade links has been checked, multiple instances of the same line will be created. This will not happen in a compiled game.



`string Controller.manufacture[int manufactureGroup].manufacture[int processNumber].tooltip`

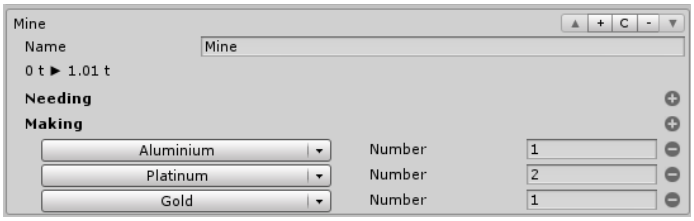
This will give you the tooltip shown for each manufacturing process saying what each process needs and makes.



12 Tips

This page contains some ideas on other ways TradeSys can be used.

- Manufacturing processes do not need to have needing or making items. This means that you can have sources and sinks in your game without any further code! For example, a mine may extract some metals, but not require the use of any items, thus no items are specified in the needing section.



- More industrialised trade posts will be able to produce items faster, and may have to wait less before it can manufacture again. Use the create and cooldown times to create this easily by making some trade posts have much higher times than others. It may also make manufacturing cheaper, and this is possible by reducing the price
- Traders may be carrying perishable items. This is possible by using manufacturing processes on the traders. For example, a trader may be carrying food, thus by adding a manufacturing process, the food can be turned into rubbish or disappear by setting up a manufacturing process and setting the times.
- Change the code inside `Controller.CalcDistance` so that the distance between your trade posts is properly calculated as this method only finds the straight line distance, which may be incorrect for your game.
- If you are wanting to edit trade post groups or factions a lot, then setting the closest posts to 0 may give improved performance. Setting this to 0 will mean that getting the distances will be quicker. However, more best trades need to be calculated, so may be slower here. Having a specific number will make the best trades faster, but calculating the closest posts is required, so may be slower. Trying out different values will be required to see what gives the best results for your game.
- In some places, TradeSys uses `Destroy(gameObject)`. These could be changed to use an object pooling manager instead. These are found in:
  - `Item.Collected()`
  - `TradePost.DeletePost()`
  - `Trader.DestroyTrader()`
- To improve performance, try and avoid using `Controller.AddPost` and `TradePost.RemovePost` methods. This is because it has to resize arrays, thus impacting performance. Instead of using remove, the trade post could just be disabled using `TradePost.EnableDisableTradeMan(false, false)`.

13 Update Log

VERSION	CHANGES
V1.0	• Initial release
V1.1	• Traders have cargo size and items require mass specified so traders cannot take an infinite number of items. • Traders can now take multiple types of item as long as they all go to the same place. • Traders can be set as expendable, so will be created at the required station and destroyed on arrival. • Can disable items at posts so will not be traded or manufactured. • UI tweaks: • Can hide or show prices at trade posts.

V1.2	• Traders have custom inspectors. This also includes buttons for post finding based on location, or location setting based on the target post.
	• Goods now have units which are based on the mass of each item.
	• Can check the numbers of items expected as time increases through manufacturing.
	• Added a fully commented player script and created a new scene with this in. This includes a fully functioning shop mode, and click on a trader to view info about the trader.
	• Added a post enable disable method.
	• Added a method for easy allowing trade of an item at trade posts.
	• Fixed the pricing of items as before any items being carried would be ignored because it would recount each time. Now this does not happen, so should improve performance!
	• UI tweaks:
	  • Can now view the items to enable / disable at trade posts increasing horizontally or vertically.
	  • Select all / select none on enable / disable at trade posts.
	  • Expand all / collapse all on goods and manufacturing in the controller.

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VERSION	CHANGES

V1.3	• Spawners have been added, and the code to allow traders to collect dropped items and continue to the correct trade post, and added a DropItem method for traders
	• Groupings. It is now possible to group trade posts together, so that not every trade post trades with every other one.
	• Added an option to change the update frequency of the post prices, and possible trades to try and improve performance.
	• Added in an overview to controller, showing information about groups, goods and manufacturing.
	• Can view trade links, spawn sphere radius and radar sphere in the scene view.
	• Removed speed multiplier from traders - this was part of the demo code, but changed the scales of everything in the scene view so it is no longer needed.
	• Fixed bug where items could not be added to manufacturing processes without trade posts being present.
	• Fixed issue where it was not possible to set the maximum number of expendable traders to 0, so could not be infinite
	• Some other performance enhancements.
	• Massive UI changes:
	  • Controller and trade posts have a toolbar to make editing easier.
	  • Boxes have been added to many editor windows to make groups more obvious and clearer.
	  • Changed style of remove buttons, drop down lists and horizontal / vertical items to improve experience

V1.4	• Added factions, with both trade posts and traders having faction options. • Changed group selection so uses checkboxes like items. • Option to view trade links while trade posts selected has been added, making it easier when editing groups and factions. • Sorted new trade post and new trader methods so includes faction selections, and trade posts have group selection. • UI tweaks: • Edited units so is the same style as the other options.

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VERSION	CHANGES
V1.5	• Spawners now don't spawn inside each other. • Spawners have more options - can now select what shape the spawn area is and the rotation. • Pause time options, so can change what the pause time for traders is, and when they pause. • Controller has a new tab when in game, showing extra information. • Manufacture pause has been edited. There is now also a cooldown time, and the way it works has been edited. • Target posts for prefabs not found in hierarchy now gets disabled rather than being hidden. • Can now add all trader prefabs into the expendable trader list, so no more searching for the prefabs. • Improved performance of the controller editor for large projects - options to find trader prefabs each time. • Fixed player script, where incorrect numbers shown if the trade post does not trade all items. • Added ability to select groups in the player script in game.
V1.5.1	• Can now use TradeSys in versions of Unity after 4.0.0! • Fixed trader stop time, so will stop for the correct length of time.
V1.5.2	• Fixed any warnings resulting from API updates. • Uses TradeSys namespace to help prevent any name conflicts

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VERSION	CHANGES

V2.0	• Whole system has been rewritten from scratch.
	• Manual has been rewritten from scratch with the update logs being the only thing kept the same!
	• Massive performance improvements.
	• Goods and manufacturing processes can now be set up in groups, useful for organisation
	• Goods can be sorted
	• Can move goods and manufacturing processes up, down and can duplicate
	• Duplicated manufacturing items are highlighted in red
	• Manufacturing check will now check item pricing, stating if a manufacturing process will never be profitable
	• Custom pricing on Trade Posts
	• Many more options such as route options — can now edit what influences traders more, profit or distance travelled
	• Greater undo support and multi object editing
	• Can now select if an item is allowed to be bought or sold at a Trade Post. Can be set as hidden to allow an item to be manufactured and used in another process.
	• Adding a controller found under GameObject > Create Other > TradeSys Controller, so no longer have to drag scripts as it is automatically done
	• Adding Trade Post and Trader scripts found under component menu
	• Can now have number limits on goods at trade posts
	• Now possible to select which goods a trader is allowed to carry
	• Further UI improvements:
	  • Can now have the TradeSys toolbar at the top with everything else scrollable
	  • Can now click on the names of options in lists to show details, not just the arrow
	  • Items in lists now much more obvious
	  • Almost all options have a tooltip
	  • Manufacturing processes tooltip now contains the items needed and made

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VERSION	CHANGES

V2.1	• Traders can now have manufacturing processes
	• Can now enable or disable a manufacturing group
	• Player scene now has demonstration of post tags, with the ability to buy trade posts
	• Player scene has examples of other uses for goods and manufacturing grouping by allowing machinery to be fitted to an owned trade post
	• Changed variables. Some moved to a custom variable others have been combined
	• Added tips page to manual
	• GUI improvements:
	  • Trader inspector has the same style as controller and trade posts
	  • Rearranged the process move buttons so is in the same order as for the goods
	  • Moved the buy, sell and hidden options for trade posts into the stock tab
	  • Clicking on the name of the group will now hide or show available options instead of using foldouts
	  • Horizontal or vertical options changed to use buttons
	• Fixes:
	  • Issue regarding player buying and selling items
	  • Trading and as a result more trades occur
	  • Traders will now go to random posts where both posts are in the same group and faction

V2.2	• Edited the buy / sell list updates so is more efficient
	• Uses sqrMagnitude instead of Vector3.Distance, so improving starting performance
	• Disabling trades at a trade post or changing factions or groups will make any trader heading to the trade post head back to where they stated from
	• Can set the closest posts to 0 so will check best trades at all posts
	• Renamed EnableDisable at trade posts to EnableDisableTradeMan
	• Added new methods:
	  • Method to add or remove items from stock at a trade post
	  • Method to allow factions or groups to be edited at a trade post
	  • CalcDistance in controller so that other distance calculations can be used not just straight line distance
	  • Added method to allow changes to buy, sell and hidden options at a trade post

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VERSION	CHANGES

V2.3	• Added in spawners. This includes a script and editor code for items too
	• Moved trader AI to a separate script so is more obvious as to what should be changed
	• Bug fixes:
	  • Fixed where item shuffling gave an error
	  • After deleting an item, going onto the manufacturing tab was not possible
	  • Sorted manufacturing mass for processes containing deleted items

V2.4	• Can now only have one controller in the scene at a time
	• Spawners will now show the circle spawn area
	• Traders will only go back to their start post if the group or faction is incorrect when the trade post's has changed. Before they would go back even if they could still go there
	• Can now select allow trades and allow manufacture in the inspector and not just through the debug menu / code
	• Added ability to collect items to the player script
	• Added option to select If the items spawned are able to be collected by a trader
	• New methods:
	  • New method to allow trade posts to be moved after the start
	  • Method to allow new trade posts to be added
	  • Method to delete trade posts
	• Bug fixes:
	  • Fixed when no units defined and a manufacture mass is meant to be 0, it would show as 1
	  • Bug giving errors produced by TradeSys when playing the game in editor and selecting a trade post
	  • Issue where spawned items would be included in item averages twice

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VERSION	CHANGES

V2.5	• Added in depots including a method to change the home post ID
	• Added in expendable traders
	• Check window will automatically update, making any changes made to processes easier to see
	• New methods:
	  • Method to destroy the trader
	  • Method to drop all the cargo or a single item
	  • Method to make changing the enabled factions for traders easier

V2.6	• Manufacturing processes can cost credits. This is set individually in each trade post and trader
	• Check manufacturing window will also show the credit change
	• Added new move options for when a trade post has nothing for a trader to take:
	  • Items per distance - go to the post with the maximum of the items it wants to sell divided by distance
	  • Best trade - calculate the best trades for the reachable posts and select the very best
	• Slight performance improvement by removing a couple of unnecessary faction and group checks

V2.7	• Moved groups, factions and post tags to a new package, TagManagement
	• Check manufacturing button is disabled if there is an undefined item in a process
	• Fixed issue where traders would go to any post in the same faction if random posts selected
	• Expendable traders will give an error if there are any null values when starting the game
	• Added new methods in the controller script:
	  • Method to return nearest post selling an item
	  • Method to return nearest post buying an item
	  • Method to return post selling item cheapest
	  • Method to return post buying an item at highest price
	  • Method to return a list of the items a post wants to buy or sell

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VERSION	CHANGES
V2.8	• Can now have multiple currencies for buying and selling goods. Also affects manufacturing processes. • Can select items to be bought, sold and hidden. This is to allow for greater options when manufacturing certain items as the previous method would prevent some options. • Manufacturing processes show percentage profits rather than raw values. • Cache groups and factions ObjectTags to improve performance. • Fixed issue if only had two trade posts. • Fixed issue with expendable traders not updating with changes. • Can now not make changes to an expendable trader unless scene is set up and has been listed as an expendable trader.
V2.9	• Support for Inventory Pro
V2.9.1	• Now shows the number of items carried by traders in brackets next to item name • Fixes for newer versions of unity
V2.9.2	• Fixed bug where traders not correctly showing number of items carried
V2.10	• Support for Inventory Master