

creating

# EXPLOSIONS

In 3D Studio Max without Plugins



Serozh Sarkisyan



# Creating Explosions in 3D Studio Max with Particle Flow

## Part I - Overview

By Serozh Sarkisyan

What you will need:

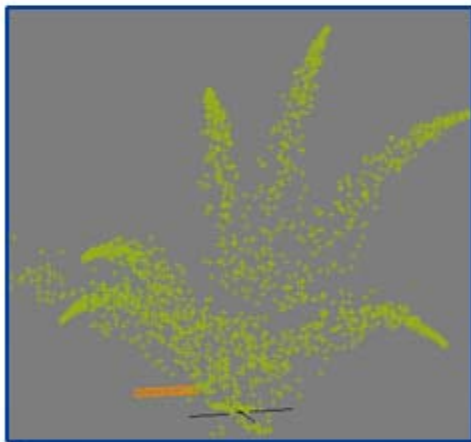
3D Studio Max version 6 or greater

Reactor (included in Max 6 and up)

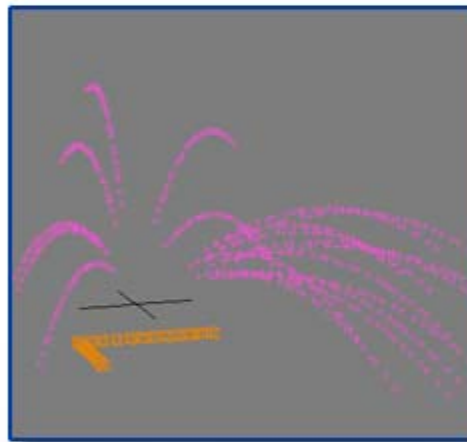
Reasonably fast computer

Time

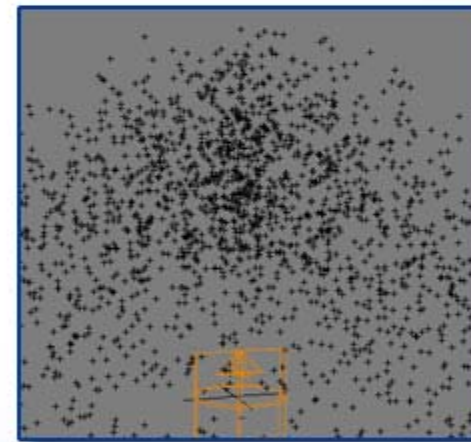
First of all, there are many different types of explosions. This one that I will show you how to make is only one of them. In the scene, you can think of it as having three “layers”. The first “layer” is the big trails of smoke. The second “layer” is the small trails of lighter colored smoke. The third “layer” is the debris thrown in all directions by the explosion. These pictures show how the scene will look on each “layer” once it is completed. We won't be using any 3rd party plug-ins to create the effect.



Layer I - Large Trails



Layer II - Small Trails



Layer III - Debris

The scene is not hard to make, but is a bit on the hefty side in terms of the number of objects to render. If your computer does not have a fast CPU, then use the same technique but build a smaller scene with less particles.



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## Part 2 - Large Trails

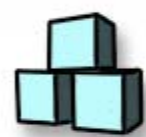
By Serozh Sarkisyan

The large trails of smoke will be created with PArray. We will have a few 4 sided spheres to start with. Then we will put a PArray on each of the low-poly spheres. By adjusting the various parameters and fine tuning the values, we should make the spheres emit particles which will in turn be the smoke after we add a good material.

Create a few spheres, all of them with 4 segments and each varying in size slightly. For this tutorial, I will make seven (7) spheres. You can choose how many you want. The more you put, the longer will be the render time.



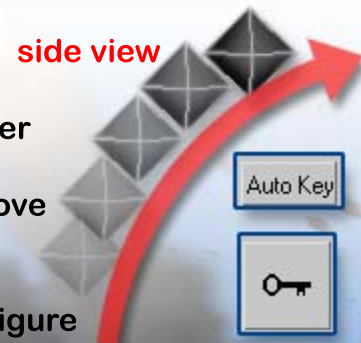
Select all the objects, apply an RB Collection on them. You do this by clicking on this icon in the toolbar on the left side. Now all the objects are in the Rigid Body Collection.



Go to Utilities>Reactor>Properties and while all the spheres are selected, put the mass at 50. This makes each sphere 50 Kilograms in weight.



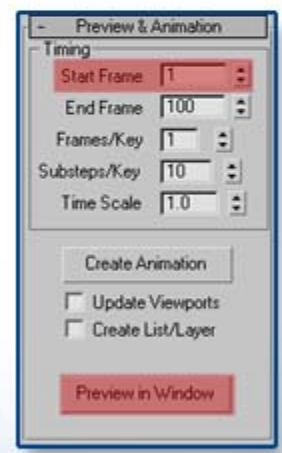
Now comes the part where we make things move. Select one sphere, turn on AutoKey by pressing the button named AutoKey on the bottom. Move the slider to frame 0 and press the button with the Key on it. Then move the slider to frame 5, and then use the move tool to position the sphere at a higher place. We are trying to make the sphere go in an arc, and we are telling it its initial path, and then we will let Reactor figure out how it will get there, and make the rest of the keyframes.



Do the same thing to all the spheres, but make sure you make them go in different directions. In other words, if you look at it from the top they should move away from the center like the petals of a flower.



Go to Utilities>Reactor> Preview and Animation, and put 2 for the Start Frame. Then press Preview in Window. If you did it correctly then the objects should fly in the arc you designated, and then Reactor will take over and continue the trajectory in a realistic fashion. If you see it working, then push the Create Animation button.



This is an angled perspective view of how your arcs will look when you are done. They all fly in different angles, at different speeds and different heights.



# Creating Explosions in 3D Studio Max with Particle Flow

## Part 3 - Small Trails

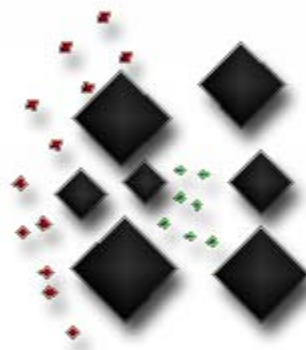
By Serozh Sarkisyan



You thought that was tedious? You're just beginning.

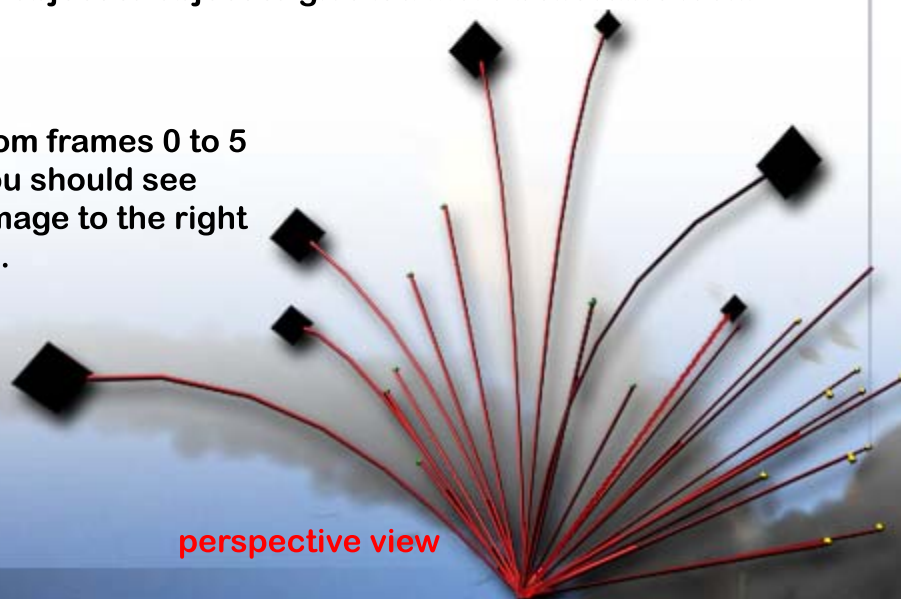
The small trails are created with the exact same method as the large trails, but the angle of the trajectories will be different. There will be two groups to the small trails. One group of them will be thrown to the side of the explosion and the other group will be thrown up and roughly follow the path of the larger trails.

Create a bunch of the smaller spheres and make them all with 4 segments. You can create as much as you want. I made 12 objects on the side and 7 objects in the middle. From the top, this is how mine looks at frame 0. Remember, you can put the objects anywhere you want, just remember to make them explode away from the center.



Do the same method we used to make the initial arc of the larger objects in Part 2. Make the end frame 5. And remember, make the height of the object on frame 5 vary from object to object to give it a more believable look.

After you animate from frames 0 to 5 on all the objects, you should see something like the image to the right (minus the red lines).



Ok, now we are going to use reactor to finish off the rest of the trajectory. So we need to add the smaller objects to an RB collection. But first, we need to get rid of the RB Collection we already have in the scene and since the large objects are all keyframes, we won't mess anything up. So select the blue RB Collection object in the scene and delete it.

Select all of the smaller pieces and press the RB Collection button on the left. Go to Utilities>Reactor>Properties and set the mass to 5. In the Preview and Animation rollout, set the Start Frame to 1 and hit Preview in Window. If it looks ok, then hit Create Animation. After it's done making all the keyframes, you can delete the RB Collection icon.

Good, Reactor should now have finished up the trajectory of your small objects. This concludes Part 3. Next we will start the Particles



By Serozh Sarkisyan

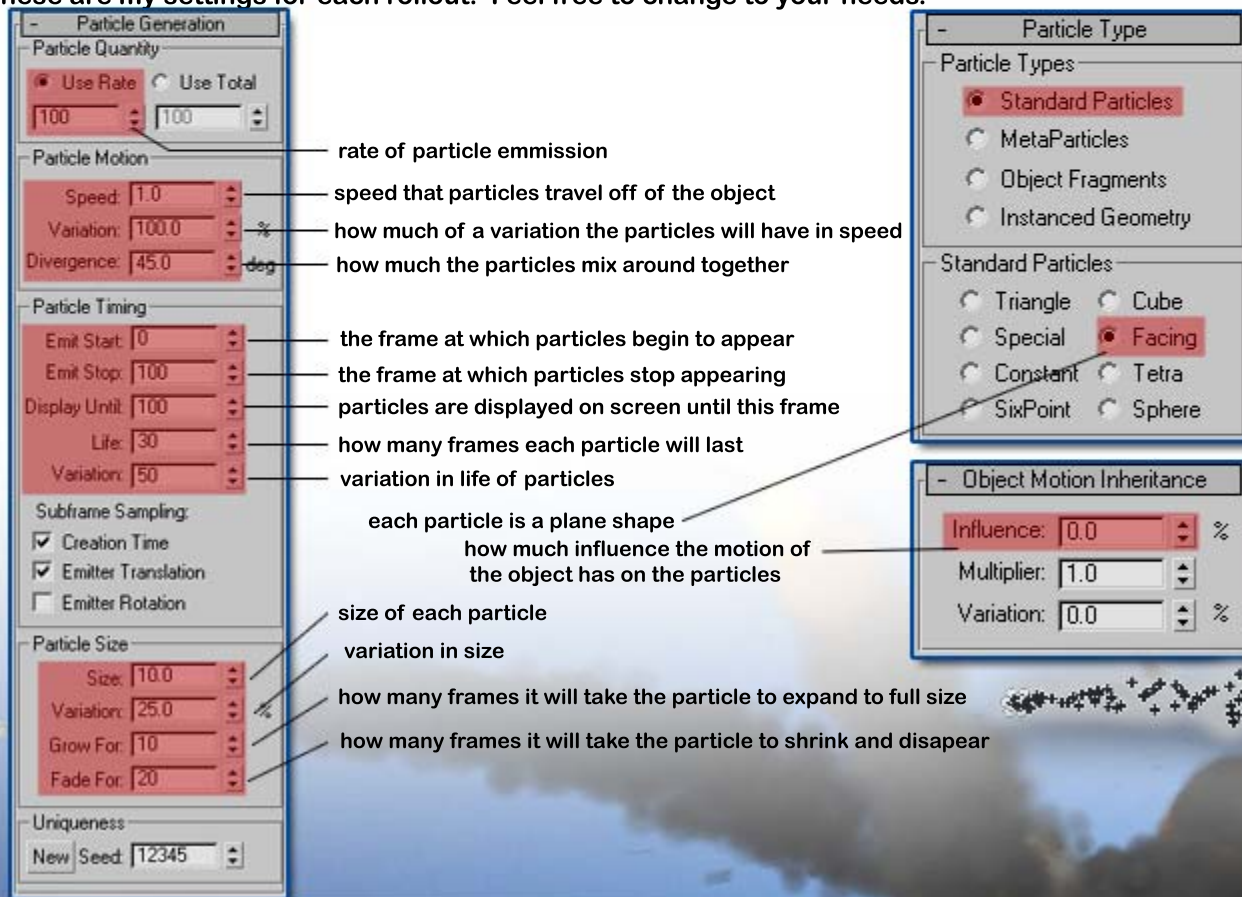
The particles in this scene will be created with Max's Particle System. We will use the PArray tool. This just shoots off particles from any object we choose. We will have as many PArrays as there are objects in the scene. But the smaller objects will have different values than the larger objects. So essentially we will just have two PArrays and copy them to each of its respective objects. First let's do the large trails.

**Go to Create>Geometry>Particle Systems>PArray. Drag in the scene to create the PArray box. It does not matter where you put the box. It is important to keep the scene orderly, so put the box a distance away from main action.**

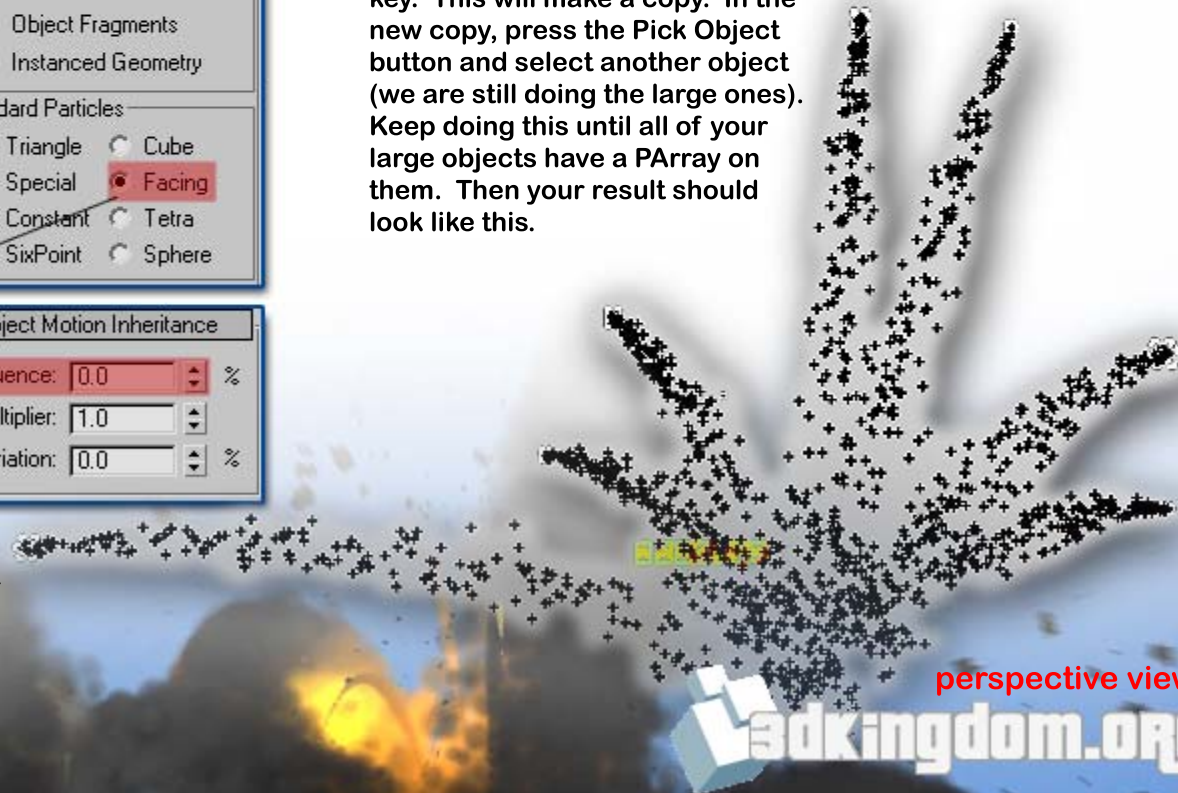
After you draw the box in the scene, you will see all sorts of options for it on the right hand side. This is where we put the various values in to change the way the particles behave.

**You will see an area labeled ‘Object-Based Emitter’. Hit the button under it that says ‘Pick Object’ and then select one of the large objects. Scroll down a bit and you will see something labeled ‘Percentage of Particles’. If you have a slower computer, put this value to 10% or lower.**

**These are my settings for each rollout. Feel free to change to your needs.**



After you get the first PArray done, just select the orange box and move it aside while holding down the Shift key. This will make a copy. In the new copy, press the Pick Object button and select another object (we are still doing the large ones). Keep doing this until all of your large objects have a PArray on them. Then your result should look like this.



# Creating Explosions in 3D Studio Max with Particle Flow

## Part 5 - The Particle System for Small Trails

By Serozh Sarkisyan

Creating particles for the small objects is similar to making them for the large objects, however some of the parameters have to be changed.

Create a new PArray. Hit the 'Pick Object' button and select one of the smaller objects. These are the settings I have:

Particle Generation

Particle Quantity

Use Rate

Use Total

10

100

Particle Motion

Speed: 0.0

Variation: 0.0 %

Divergence: 0.0 deg

Particle Timing

Emit Start: 0

Emit Stop: 100

Display Until: 100

Life: 30

Variation: 0

Subframe Sampling

☒ Creation Time

☒ Emitter Translation

☐ Emitter Rotation

Particle Size

Size: 5.0

Variation: 25.0 %

Grow For: 20

Fade For: 10

Uniqueness

New

Seed: 12345

Particle Type

Particle Types

Standard Particles

MetaParticles

Object Fragments

Instanced Geometry

Standard Particles

Triangle

Cube

Special

Facing

Constant

Tetra

SixPoint

Sphere

Object Motion Inheritance

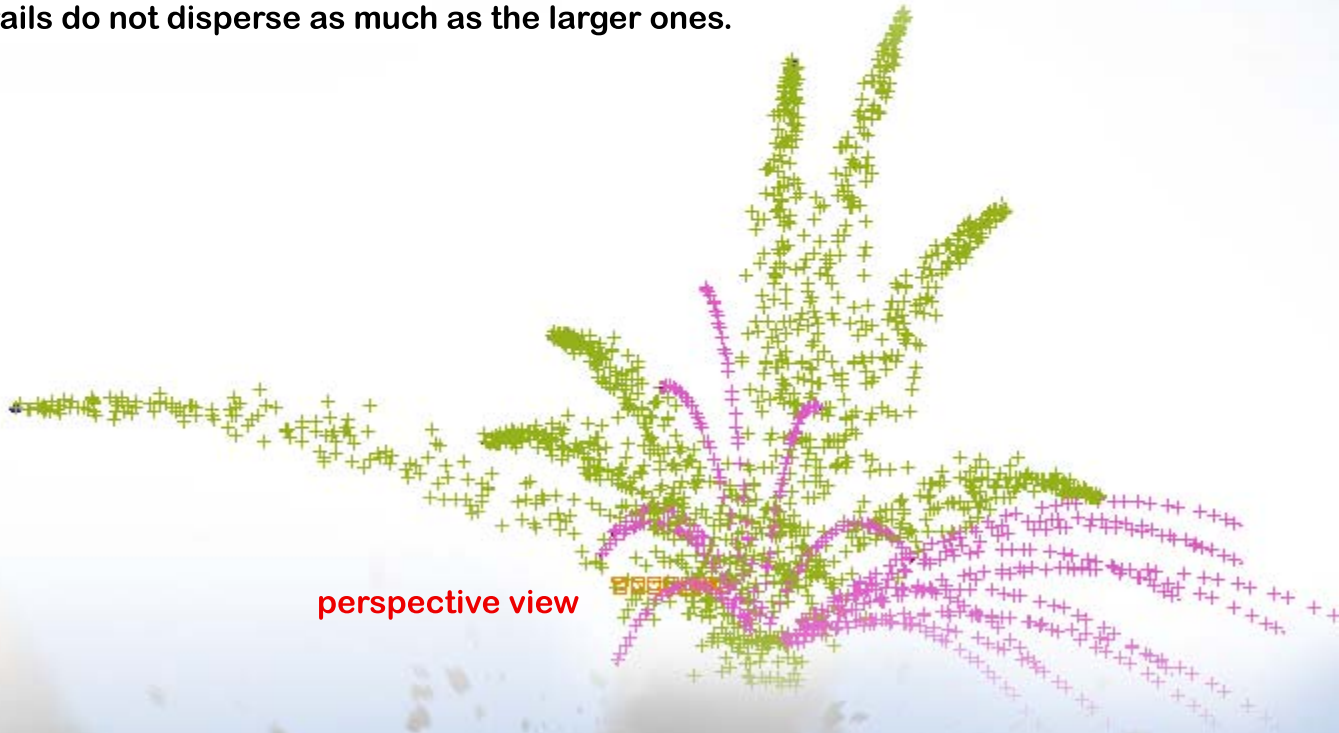
Influence: 0.0 %

Multiplier: 1.0

Variation: 0.0 %

explanations for each parameter are on previous page

Once you make one PArray, copy it by holding down the Shift key and moving it, and then stick it onto another one of the smaller chunks by pressing the 'Pick Object' button and selecting another object in the scene. Once you have given a PArray to all of the objects in the scene, it should look like this. Notice how the smaller objects' trails do not disperse as much as the larger ones.



perspective view



# Creating Explosions in 3D Studio Max with Particle Flow

## Part 6 - Small Debris

By Serozh Sarkisyan

In this part, we will make hundreds of tiny little triangles that will burst out of the center of the explosion and then we will use a Gravity space warp to simulate the effects of gravity on the debris. What is different here is we are going to use a SuperSpray rather than a PArray.

Create a SuperSpray by going to Create>Geometry>Particle Systems. Placement is important here, so place it exactly where the explosion will happen. For the SuperSpray, you don't need to specify an object to emit particles.

Here are my settings, feel free to tweak to your needs:

Basic Parameters

SUPER SPRAY

Particle Formation

Off Axis: -7.0 deg

Spread: 45.0 deg

Off Plane: 21.0 deg

Spread: 95.0 deg

Display Icon

Icon Size: 59.489

Emitter Hidden

Viewport Display

Dots

Ticks

Mesh

BBox

Percentage of Particles: 100.0 %

Rotation and Collision

Spin Speed Controls

Spin Time: 30

Variation: 0.0 %

Phase: 0.0 deg

Variation: 0.0 %

Spin Axis Controls

Random

Direction of Travel/Blur

Stretch: 0

User Defined

X Axis: 1.0

Y Axis: 0.0

Z Axis: 0.0

Variation: 0.0 deg

Particle Generation

Particle Quantity

Use Rate

200

100

Particle Motion

Speed: 20.0

Variation: 10.0 %

Particle Timing

Emit Start: 0

Emit Stop: 10

Display Unit: 100

Life: 100

Variation: 0

Subframe Sampling

Creation Time

Emitter Translation

Emitter Rotation

Particle Size

Size: 2.0

Variation: 100.0 %

Grow For: 1

Fade For: 1

Particle Type

Particle Types

Standard Particles

MetaParticles

Instanced Geometry

Standard Particles

Triangle

Cube

Special

Facing

Constant

Tetra

SixPoint

Sphere

To simulate gravity, we will create a Gravity Space Warp. Go to Create>Space Warps>Forces>Gravity. Drag the icon anywhere on the scene. We need to punch in a few numbers for the gravity, so do this:

Parameters

Force

Strength: 1.097

Decay: 0.01


Planar

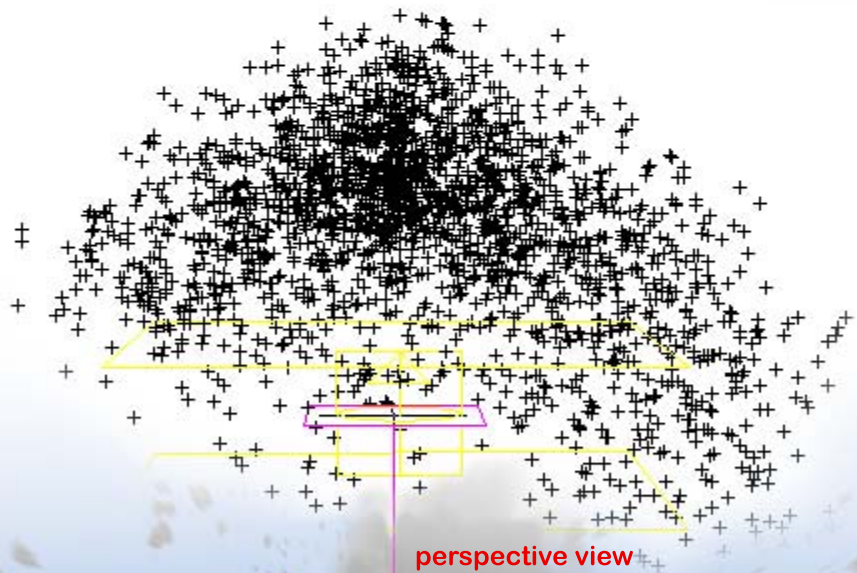
Spherical

Display

Range Indicators

Icon Size: 83.182

Then, select any part of the debris particles, click on this  button, then click on the arrow you see pointing down. What we just did was bind the particles to a space warp, in this case the gravity. And now, you will see your debris is affected by the gravity.

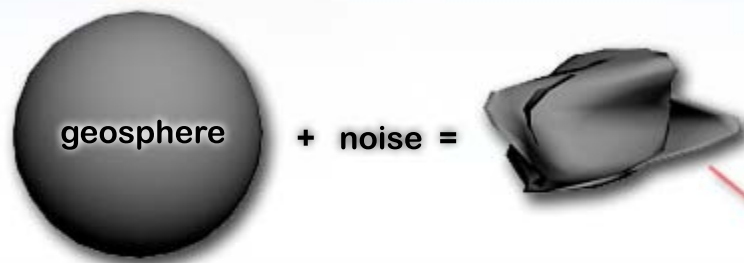


# Creating Explosions in 3D Studio Max with Particle Flow

## Part 7 - Large Debris

By Serozh Sarkisyan

To make the large chunks of debris, we will just make a Geosphere, then add a noise modifier to it, and we will get something that looks sort of like an asteroid.

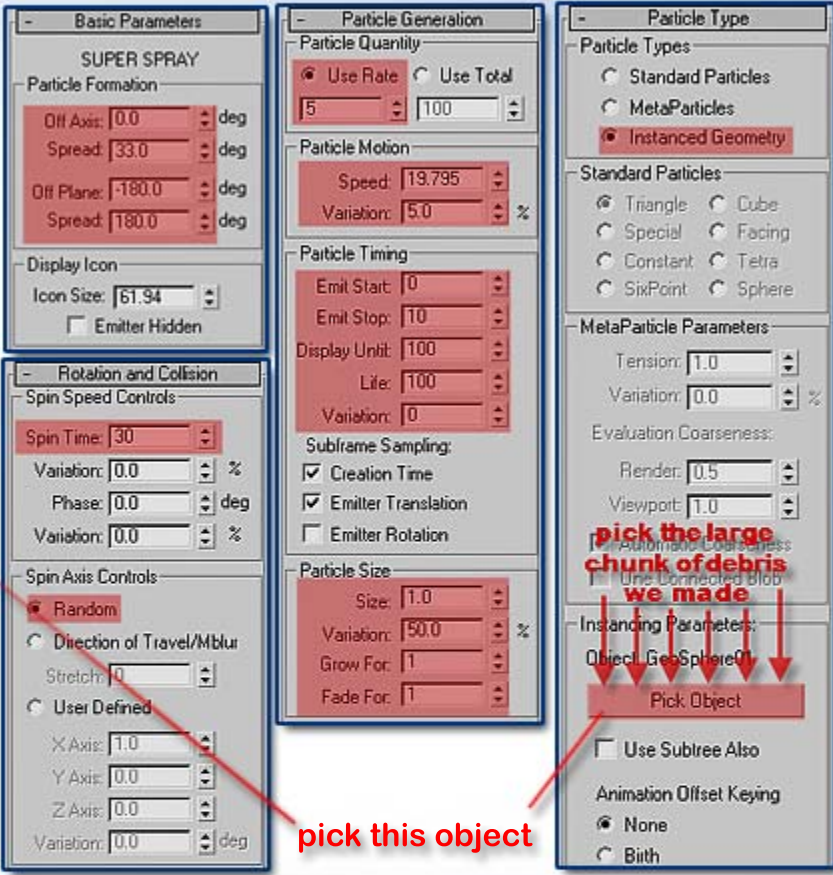


Now put that object aside for now.

We will make another SuperSpray, but this time instead of spraying out little triangles, it will spray out instances of our large chunk of debris that we just made.

So, to start, create a new SuperSpray in the scene, position it where we put the other one. If the scene is too busy for you to see anything properly, you might want to hide any unnecessary things, so select your new SuperSpray and also select that object we made earlier and right click and choose 'Hide Unselected'.

Now let's add the values in for the SuperSpray.



Now we have to make gravity affect it. We already have a Gravity Space Warp in our scene so all we have to do is bind our particles to the space warp. select the particles we just made, hit the Bind of Space Warp button on the top, , then click on the Gravity icon (The downward pointing arrow)

NOTE: if you cannot see the gravity displayed in your scene, then right click, and select 'Unhide All'.





# Creating Explosions in 3D Studio Max with Particle Flow

## Part 8 - Materials

By Serozh Sarkisyan

Materials for this scene are very easy to make. There are really only 3 materials. Dark smoke, light smoke, and debris.



large trials

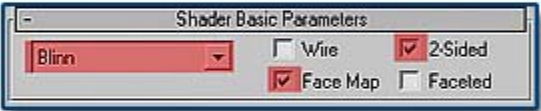


small trails

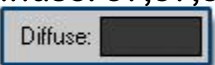


debris

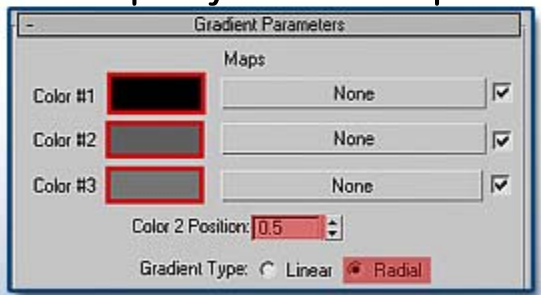
Shader Basic Parameters



Diffuse: 57,57,57



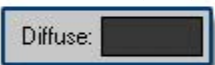
Opacity: Gradient Map



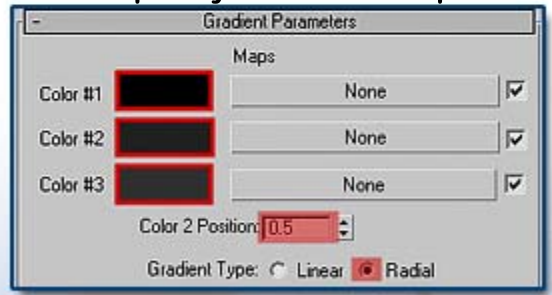
Shader Basic Parameters



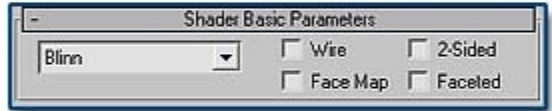
Diffuse: 57,57,57



Opacity: Gradient Map



Shader Basic Parameters




Diffuse: 0,0,0



Glossiness = 0



To apply the textures, select the particles you want to apply them to, select the texture from the Material Editor, and hit this button: 

# Creating Explosions in 3D Studio Max with Particle Flow

## Part 9 - Lighting

By Serozh Sarkisyan

We create the yellows and oranges by putting omni lights in various places in the scene. Follow this diagram for each trail of smoke.



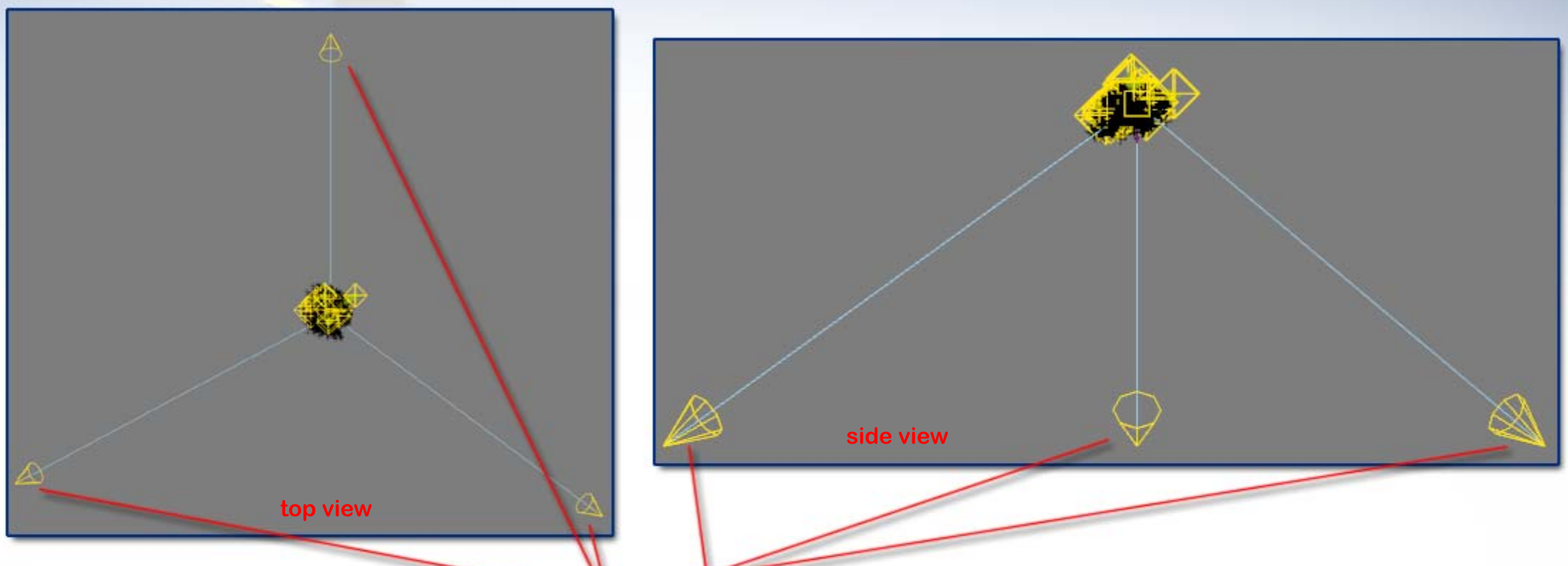
Remember to change the settings and move around the lights until you get a good balance of yellows and oranges.



# Creating Explosions in 3D Studio Max with Particle Flow

## Part 9 - Lighting continued

By Serozh Sarkisyan



Target Spot  
Color: 255,255,255  
Intensity: 1  
Shadow On: Shadow Map

To make the orange glow in the middle of the explosion, we have to put an orange light in there. But we have to make it gradually grow in intensity until a certain time, and then gradually fade in intensity. To do this, we will use the AutoKey. Create an omni light above the explosion. Color: 255,132,0. No shadows. Turn on AutoKey, go to frame 0 and change the Intensity to 0. Go to frame 50 or so, change the intensity to 10, go to the end frame and change the intensity to 0.



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## Part 10 - Rendering

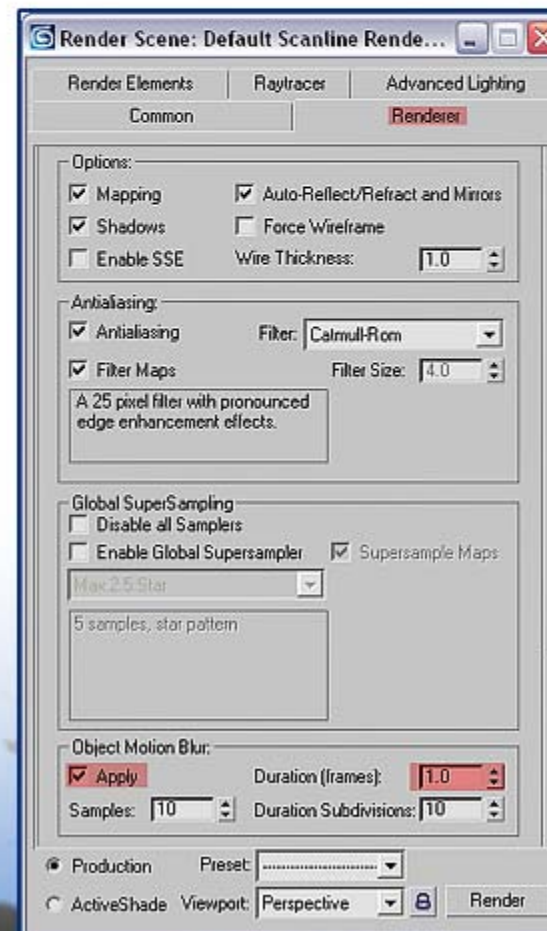
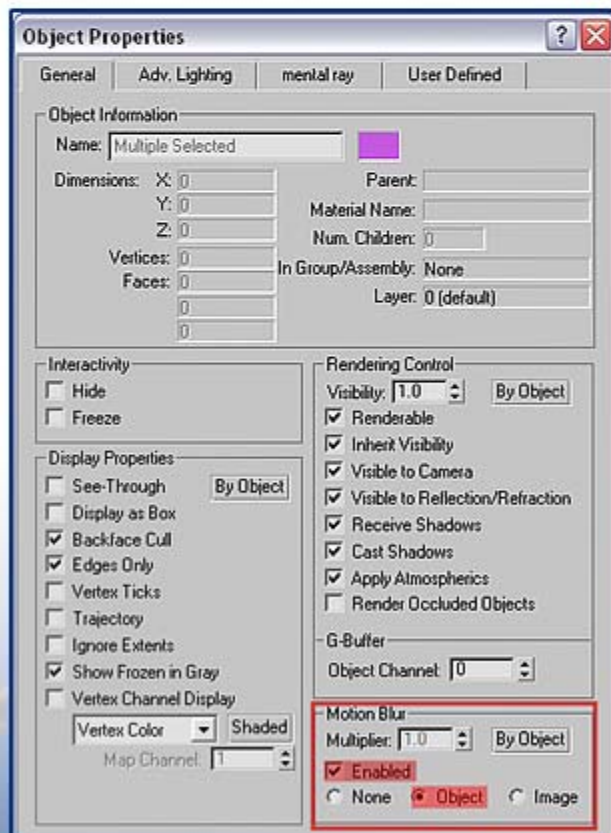
By Serozh Sarkisyan

You're finally done! To get the maximum effect in our render, we should give a good background, and also give a nice motion blur effect.

Go on google and search for 'sky' in images. Once you find a nice looking high quality image, save it to your computer. In 3D Studio Max, press '8' on your keyboard. Click where it says 'NONE' and then choose Bitmap, and then find the image of the sky you downloaded.

Now let's do the motion blur. You have a choice of either applying motion blur to only the debris, or the whole object including the smoke and fire. Select all of the objects you want to have motion blur, right click, go to Properties. You will see something like the picture below. Check the 'Enabled' box, and choose 'Object', then hit OK.

Hit F10 to bring up the Render Dialog. Go to the Renderer tab and scroll down to where it says 'Object Motion Blur'. Put a check in the Apply box. Put the Duration (frames) to 1. Increase the Subdivision to get better looking results. Then hit render.



**YOU'RE DONE**

If you have any comments  
or questions or difficulty,  
email me at:

[serozhs@yahoo.com](mailto:serozhs@yahoo.com)

