**Appendix F - Test Plan**

**Phase One - Models**

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| ID | Description | Expecting | Results | Result Image |
| P1T01 | Load a model into the XNA framework, so that the compiler can read and store the models information | Compiler runs and builds the application with no errors after reading the model .x files | The application compiled and was built successfully |  |
| P1T02 | Render the loaded model so that the model is viewed within the XNA viewport | Using basic effects to render the model, should show the model in the XNA window | The model was rendered and is viewed in the window |  |
| P1T03 | Test Model Skyline, for vertices and rendering issues | Some vertices loss, and texture loss due to errors when importing into 3D Studio Max 2010 | The test was as expected, failed vertices occurred |  |
| P1T04 | Test Model SL500, for vertices and rendering issues | No errors when loaded into 3D Studio Max 2010, and textures should all be loaded into XNA and rendered | The test was as expected, what loaded in 3D Studio Max, was the same in XNA |  |
| P1T05 | Test Model BMW330 for vertices and rendering issues | No errors when loaded into 3D Studio Max 2010, but no textures when rendered, also expecting large model | The model loaded but model was very big, and lost texture maps. |  |

**Phase Two – Graphics**

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| ID | Description | Expecting | Results | Result Image |
| P2T01 | Loading vertices to render a flat pane on the screen | A flat grey terrain pane rendered onto the screen | Terrain was created and data was stored into an array. |  |
| P2T02 | Loading a Sky Box model into the application, and render using the effect file provided by Riemer tutorials | A sky dome rendered around the terrain with a cloud map texture | Sky Dome was created and loaded, results were as expected |  |
| P2T03 | Test the camera from a perspective behind the car model | Camera positioned behind the car model | Results of the cameras position was as expected |  |
| P2T04 | Test the camera from a perspective inside the car model on the drivers side | Camera positioned inside the car model with a view looking outside the windows | Results of the cameras position was as expected |  |
| P2T05 | Test the camera by rotating the car and ensure the camera follows the cars orientation | The camera rotates with the cars orientation staying at its offset position | When the car rotates its orientation the camera rotates with it |  |
| P2T06 | Test the camera by moving the car from a to be and ensure the camera follows the cars position | The camera follows the cars position as the car moves around the terrain, staying at its offset position | When the car moves the camera chases the car, and stays in its offset position |  |

**Phase Three – Advance Graphics**

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| ID | Description | Expecting | Results | Result Image |
| P3T01 | Load a height map into the XNA framework, and use it to adjust the points on the terrain to the relative height | The height data will be taken from the height map and will be used to determine the height of the points on the terrain, the terrain will be rendered with hills and mountains | The results were as expected, as the terrain is now changed into a hill and mountain scenery |  |
| P3T02 | Ensure the peaks on the height are a White colour | The peaks of the highest points are coloured in white | Highest peaks are white |  |
| P3T03 | Ensure the mid points are of a dark green and a light shade of green | The hills and mountains are coloured in green | Middle section has two shades of green |  |
| P3T04 | Ensure the lower points are of a brown colour | The lowest parts of the mountains are coloured in brown | The lowest end of the hills are brown |  |
| P3T05 | Ensure the ground with 0 height is a grey colour to present the road | The ground level is coloured in grey | The ground level is grey |  |
| P3T06 | Test the camera delays when the car turns left or right, so the camera view interpolates the camera's orientation | Whiles turning left or right the camera will slowing orientate to the cars orientation | The results were as expected. |  |
| P3T07 | Test the collision detection with the model and the height map, so the model does not drive through the hills and mountains. | When the car collides with the hills and mountains, the car will stop dead, and will not drive through the mountains | The car does stop dead on the mountain, but from its centre position of the car. |  |

**Phase Four – Refactoring**

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| --- | --- | --- | --- | --- |
| ID | Description | Expecting | Results | Result Image |
| P4T01 | Test the terrain map still loads after refactoring the relevant methods into its own object | The terrain map still loads and can still be seen within the scene | The results were as expected |  |
| P4T02 | Test the sky dome still loads after refactoring the relevant methods into its own object | The sky dome still loads and can still be seen within the scene | The results were as expected |  |
| P4T03 | Test the car model still loads after refactoring the relevant methods into its own object | The car model still loads and can still be seen within the scene | The results were as expected |  |
| P4T04 | Test the camera still loads after refactoring the relevant methods into its own object | The camera still works as the scene can still be viewed in the window | The results were as expected |  |
| P4T05 | Test the chase camera so that it follows the car object, and interpolates the orientation of the car | When the car moves around the scene, the camera follows the car, and also interpolates through the orientation of the car | The results were as expected |  |
| P4T06 | Test the stationary camera so that overlooks the whole track, and stays in one position | The stationary camera views the whole track, and when the car moves the camera stays in its position | The results were as expected |  |

**Phase Five – Exia Engine**

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| ID | Description | Expecting | Results | Result Image |
| P5T01 | Test Acceleration command if the force is set to 5000 in the forward direction. | The car should accelerate at 2.724 ms² | The results were outputted into command line |  |
| P5T02 | Using the results from P5T01, test the velocity of the car from its initial start at 0, until it reaches approx 10 seconds | Using the velocity calculations the velocity of the car should be about 27.4 ms when it reaches 10 seconds | The results were outputted into command line |  |
| P5T03 | Using the results of P5T02 test the unit converter, so it converts ms to MPH. Use the expecting velocity when time reaches approx 10 seconds | From the calculations from P5T02 the expecting was 27.4 ms so converting ms to mph is 61.4 mph | The results were outputted into command line |  |
| P5T04 | Using the results of P5T02, determine the displacement, and distance the car has travelled in approx 10 seconds | The position of the car should be approx 137.5 m | The results were outputted into command line |  |
| P5T05 | Test the rpms of the car if it is accelerating at the rate tested in P5T01 in approx 5 seconds during 1st gear | The approx RPM after 5 seconds during 1st gear is 3990 RPM | The results were outputted into command line |  |
| P5T06 | Test the rpms of the car if it is accelerating at the rate tested in P5T01 in approx 10 seconds during 3rd gear | The approx RPM after 10 seconds during 3rd gear is 3164 RPM | The results were outputted into command line |  |
| P5T07 | Test the torque of the car during 1st gear and velocity is at 10 ms | The torque should approx be about 479.8 Nm | The results were outputted into command line |  |
| P5T08 | Test the torque of the car during 4th gear and velocity is at 38 ms | The torque should approx be about 478.9 Nm | The results were outputted into command line |  |
| P5T09 | Test the traction force using the torque calculated and the information needed in P5T07 | The traction should approx be 10303.6 N | The results were outputted into command line |  |
| P5T10 | Using the force calculated in P5T09 calculate the acceleration of the car, and determine its velocity in MPH after 5 seconds | The velocity of the car should approx be 62.9 mph at an acceleration rate of 5.62 ms² | The results were outputted into command line |  |
| P5T11 | Calculate the drag force when the car's velocity is using the value calculated in P5T10 | The drag force would approx be 295 N | The results were outputted into command line |  |
| P5T12 | Calculate the rolling force of the car | The rolling force is expected to be at 270 N | The results were outputted into command line |  |
| P5T13 | Calculate the full brake force, when brake position is full | Brake force expected to be at 11160 N | The results were outputted into command line |  |
| P5T14 | Calculate the total force using the calculations from P5T09, P5T11, and P5T12. | Total net force is 9738.6 N | The results were outputted into command line |  |
| P5T15 | Calculate the total force using P5T14, and apply 50% of the brakes | Total net force is 4158.6 N | The results actually showed 4353.7 N |  |
| P5T16 | Calculate the front and rear wheel down force when the car acceleration is 0 | Front wheel would be at 4410.33 N and rear wheel would be at 4590.34 N | The results were outputted into command line |  |
| P5T17 | Calculate the front and rear wheel down force using the acceleration calculated in P5T10 | Front wheel would be at 2396.1 N and rear wheel would be at 6604.5 N | The results were outputted into command line |  |
| P5T18 | Test the over steering around a corner, that will affect the car to slide sideways | The car model begins to slide sideways and travel through the X axis direction | The results were as expected |  |

**Phase Six – Interface Information**

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| ID | Description | Expecting | Results | Result Image |
| P6T01 | Test that the display renders the Speed, Gear, and Revs onto the screen | The information should be rendered on the bottom right corner of the view window | The results were as expected |  |
| P6T02 | Speed updates as the car travels and accelerates | As the car accelerates the speed increases | The results were as expected |  |
| P6T03 | Gear image changes when the gear is changed | When the gear changes the image changes to the gear that has been selected | The results were as expected |  |
| P6T04 | Revs counter is updated when the car accelerates | Rev changes as the car accelerates | The results were as expected |  |

**Phase Seven – Camera Effects**

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| --- | --- | --- | --- | --- |
| ID | Description | Expecting | Results | Result Image |
| P7T01 | Test the camera tilts backwards when the car accelerates | When the throttle is down the camera tilts backwards | Results were as expected, as the car accelerated the camera tilted backwards |  |
| P7T02 | Test the camera tilts forwards when the car decelerates | When the brake is fully down the camera tilts forwards | Results were as expected, as the car braked the camera tilted forwards |  |
| P7T03 | Test the camera tilts right when the car turns into a left corner | When the car goes into a left turn, the force will tilt the camera right | Results were as expected, as the car turned left the camera tilted right |  |
| P7T04 | Test the camera tilts left when the car turns into a right corner | When the car goes into a right turn, the force will tilt the camera left | Results were as expected, as the car turned right the camera tilted left |  |
| P7T05 | Test the camera whiles the car is driving at constant speed | The camera stays stationary in the centre, as no forces are affecting the camera | The results were as expected but was difficult to execute |  |

**Phase Eight – Input**

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| ID | Description | Expecting | Results | Result Image |
| P8T01 | Test the inputs acceleration pedal, is affecting the amount of throttle, 0 throttle | When the pedal is not pressed down there is no acceleration of velocity | The results were as expected as the velocity of the car stayed at 0 |  |
| P8T02 | Test the inputs acceleration pedal, is affecting the amount of throttle, 0.5 throttle | When the pedal is pressed half way the amount of acceleration is minimal but the velocity does increase | The results were as expected, as the car gradually increased its speed |  |
| P8T03 | Test the inputs acceleration pedal, is affecting the amount of throttle, 1.0 throttle | Full throttle will cause the car to acceleration at its maximum point, causing the car to increase its velocity quickly | The results were as expected, as the car rapidly accelerated. |  |
| P8T04 | Test the input brake pedal, is affecting the amount of brake force, 0 brake force | Car continues at the velocity it is going if no brake force is applied | The results is as expected, but velocity does still increase if the throttle is used |  |
| P8T05 | Test the input brake pedal, is affecting the amount of brake force, 0.5 brake force | Car gradually slows down, as a small amount of brake force is inputted | The results were as expected |  |
| P8T06 | Test the input brake pedal, is affecting the amount of brake force, 1.0 brake force | Car slows down and decelerates the car to a holt, as full brake force is applied | The results were as expected, as the car rapidly decelerates when the brake pedal is applied |  |
| P8T07 | Test the steering left turn at one rotation | The car begins to turn left at a small angle | The results is as expected |  |
| P8T08 | Test the steering left turn at full lock | The car turns left at its maximum angle | The results is as expected |  |
| P8T09 | Test the steering right turn at one rotation | The car begins to turn right at a small angle | The results is as expected |  |
| P8T10 | Test the steering right turn at full lock | The car turns right at its maximum angle | The results is as expected |  |
| P8T11 | Test the neutral gear, and press the throttle pedal | Neutral gear is when there is no gear, so the car stays stationary when the throttle pedal is applied | The results is as expected |  |
| P8T12 | Test the first gear, and press the throttle pedal | As the first gear is applied the car begins to move as the throttle pedal is pressed | The results is as expected |  |
| P8T13 | Test the gear change from one to second, with the use of the clutch | Gear will change from first to second gear, and the ratios will change | The results is as expected |  |
| P8T14 | Test the gear change from second to third without the use of the clutch | Gear will not change and will remain in second gear | When input device has selected the next gear without the clutch, once the clutch is pressed it instantly changes into the next gear. |  |
| P8T15 | Test the gear reverse when the car is stationary and apply the throttle | The car begins to move backwards | Results were as expected, as the car slowly travels backwards |  |
| P8T16 | Test the car turns left in reverse gear, when the steering wheel is steered left | During reverse gear if the steering wheel is rotated left, the car begins to reverse into the left direction | The results were as expected |  |
| P8T17 | Test the car turns right in reverse gear, when the steering wheel is steered right | During reverse gear if the steering wheel is rotated right, the car begins to reverse into the right direction | The results were as expected |  |
| P8T18 | Test the gear change from second to reverse whiles the car is moving | The gear does not change to reverse unless the velocity of the car is at 0 | The results were as expected |  |

**Phase Nine – Sound Effects**

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| --- | --- | --- | --- | --- |
| ID | Description | Expecting | Results | Result Image |
| P9T01 | Test the engine sound when the car is at neutral | The sound should be very quiet, and the pitch should be low too | The results were as expected |  |
| P9T02 | Test the engine sound when the car is at First and accelerating | The sound should gradually get louder and the pitch should get higher towards the higher end of the rev's | The results were as expected |  |
| P9T03 | Test the sound when the car change's gears | A small sound of a changing gear plays each time the gear changed | The results were as expected |  |