

A D A S T R A



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QUICK START GUIDE

The following section is intended for all those people who really just cannot be bothered to read instructions and summarises important aspects of the game that the user should be aware of before executing it.

ESSENTIAL KNOWLEDGE

1. The option screens are accessed via the 'Esc' key and allow the Input Control method to be changed, the Video mode to be altered and the user preferences to be adjusted.
2. Ad Astra supports six different control methods described in Section 2.5 of the Manual. Although the default mechanism, 'Pitch+Roll' provides very precise control of the spacecraft, it may not be the most intuitive of the options provided. If a different control method is selected then the sensitivity settings may need to be adjusted to yield the best results.
3. Deuterium is the fuel required to travel between Star Systems and can be bought via the Stock Market at space stations and city landing pads.
4. The 'space key' will pause the game and should be used when things get 'hot' since all screens and systems can be freely accessed allowing time to formulate a suitable combat, or exit strategy.
5. The 'right mouse button' will deactivate user control and allow the windows in the main screen to be accessed.
6. The help screens can be accessed via the 'H key'. These provide information describing the control keys together with weapon and spacecraft statistics.
7. If you are new to the game then you can prevent indiscriminate attacks by 'ticking' the 'passive pirate/alien' boxes in the preferences screen described in Section 2.2 of the manual. Selecting this option will not cause current aggressors to break off their attack; however it should stop any new ones from joining in.
8. The F12 key saves the game without prompting and hardly interrupts the game play – it should be used frequently. Games can be loaded via the option screen and screen shots together with time tags are used to identify particular saved games. Deleting a saved game moves it to the recycle bin and this should be periodically emptied.
9. The Auto Pilot can be engaged via the 'A' key and will cause your spacecraft to fly to the currently selected target. The following types of target can be selected:
 - Spacecraft. Selected via the 'v' key (standing for vessel) or by using the Long Range Scanners. It is also possible to left click on ships from the main screen by holding down the 'right mouse button' in order to disable mouse control.
 - Space Stations. Selected via the 's' key or from within the Solar System screen (F1 Key).
 - Planets. Selected via the 'p' key or from within the Solar System screen (F1 Key).
 - Cities. Selected via the 'o' key or from within the Solar System screen (F1 Key).
 - Any point on a planets surface. Enter to Solar System screen (F1 key) and select the required planet. Zoom into the planet using 'Page Up/ Down' keys and left click on the desired location.

INCREASING SYSTEM PERFORMANCE

Ad Astra will attempt to choose the most appropriate default settings by inspecting the host machines settings at start-up. However if the game continues to run slowly then the following suggestion may be of help:

1. Enter the Video options screen via the 'Esc' key, change the display mode to use a 16 bit palette (e.g. 1240x1024x16) and then press 'Apply'. This will free off considerable amounts of video memory and also mean that less information needs to be written to the video buffers. If the resulting rendering appears to be very coarse then it may be necessary to 'Save' the option and completely restart the game from windows since some video cards seem to do odd things when the palette is changed. Reducing the resolution may also help, but other options should be tried first.
2. Enter the Preferences screen via the 'Esc' key and deselect the 'Hi Altitude Detail' in the Fractal options. This should speed up rendering when in high orbit above a planet.

3. Enter the Preferences screen via the 'Esc' key and deselect the 'Hi Res Textures'. This will free off more video memory and may improve rendering performance when in close proximity to a planet.
4. Enter the Preferences screen via the 'Esc' key and deselect the 'Cloud Rendering' in the Fractal options. This will mean that fewer large objects need to be drawn and should improve performance when within a planets atmosphere or in low altitude orbit.
5. Enter the Preferences screen via the 'Esc' key and adjust the 'Min Vegetation/ Animal size' sliders in the Fractal options. This will adjust the amount of flora/ fauna drawn when in close proximity to a planets surface.

Each of the options 2 -5 will take immediate effect.

MAKING YOUR FIRST KILL AND CLAIMING SALVAGE

Salvaging space wrecks is the quickest way of turning a profit in Ad Astra and if there isn't enough debris lying around then a spot of bounty hunting may be required. Follow these steps to make your first kill and claim salvage rights:

1. At a space port equip your spacecraft with 'Enhanced Long Range Scanners', 'Enhanced Short Range Scanners' and fill your missile magazine with purely destructive missiles. It may also be worth filling up your hold with Deuterium and pre-selecting a nearby star system in the Galactic Map (F2 key) if a quick escape is required.
2. Use your 'Enhanced Long Range Scanners' to select a suitable victim. This should be either a pirate or an alien as it is not a good idea to attract the attention of the local police force. Also the selected ship should not be much larger than your current spacecraft otherwise the tractor beam will be unable to pick it up. The 'Spacecraft Statistics' in the help screens ('H' key) should be of assistance here. If you are flying a 'Taipan' then each of the following are viable targets :
 - Boomslang
 - Sabre
 - Cutlass
 - Rapier
 - Warlock
 - Gy-Raptor
 - Hornet
 - Reaver
 - Beaufighter
 - Banshee

Larger ships such as the Condor can also be picked up by a Taipan, however they will need to be reduced in size by blasting off their wings and other extremities first.

Another aspect that needs to be borne in mind when selecting a target is the number of engine clusters it possesses. Alien spacecraft such as the Warlock and Gy-Raptor support five sets of engines and if an initial frontal assault on the cockpit is unsuccessful then these vessels can be very difficult to 'disable'.

3. Undock from the Space Port, select your victim and engage the auto pilot. As you approach the ship and the auto pilot disengages you should use the Long Range scanner to find out what it's up to. If it is simply patrolling then it may be best to wait for it to launch an attack on your ship as this will give you a good chance of destroying the vulnerable cockpit leaving most of the ship intact. If the spacecraft is already engaged in combat then you'll need to attack from the rear.
4. If a frontal assault occurs then you should launch a missile when within range (the targeting sights should change colour). If the missile destroys the cockpit and disables the craft (indicated by a quick burst of the 1812 overture) then you should pause the game by hitting the space bar. This will give you the chance to plan your interception course to pick up the wreckage as it sweeps past. You need to prepare to fly just over the stricken craft and engage the tractor beam by repeatedly pressing the '[' key. Once you are ready unfreeze the game and execute your planned manoeuvre. When the tractor beam secures its target you should hear a buzzing sound and subsequent pressing of the '[' key will indicate that the tractor beam is already in use.

5. If the frontal assault failed or was not possible then you will need to take out the engine clusters from the rear. Swing round onto your prey's tail firing all your cannons and unleashing a missile. Don't fire too many missiles otherwise you risk blowing the ship up completely or leaving very little to salvage. Once sufficient damage to the engines has been sustained then you should hear the sound indicating that the ship is disabled as described previously. The wreckage will gradually slow down and you should be able to catch up with it to pick it up.
6. Once the salvage has been secured then freeze the game using the space key as you now need to determine where to sell it. If you're in the middle of a dog fight with other aggressors then it may be best to open a wormhole via the 'W' key and enter a quieter system. If you didn't select a system while you were docked then you can do so now. If things are relatively quiet however then you should fly towards the nearest space station and once within docking distance you should release your salvage using the 'J' key so that it drifts towards the station. Once within range the space station will pick it up and you should be rewarded with a salvage statement and any bounty that was placed on the malefactors head.

INTRODUCTION

Ad Astra is an open-ended space game set in a future several hundred years from now. There are no objectives other than to survive and make money. Although it's possible to trade, the emphasis has been placed firmly on combat and exploration with lucrative career opportunities available in the form of bounty hunting, deep space salvage, law enforcement and crime.

In the one hundred years since the first artificial wormhole was developed, the exploitation of the star systems surrounding our sun has been aggressively pursued. Thousands of planets have been colonised and the need for an ever-greater supply of resources drives further expansion at a relentless pace. Whilst the inner star systems are relatively safe the uncontrolled pursuit of wealth has allowed crime to flourish and the frontier is effectively lawless.

Whilst alien life is abundant and varied throughout the known galaxy, nothing particularly intelligent has so far been discovered. However, constant rumours and tall stories from the distant edges of space abound and there is a dawning realisation that we may not be alone after all.

SECTION 1: SCREENS

The game supports five specific types of screen referred to as the Main Screen, the Tactical Screen, the System Map, the Galactic Map and Ship Status. Each of these screens can be accessed via the function keys as detailed in the table below.

CONTROL KEYS	
ESC	Freeze Game and bring up MAIN MENU
F1	Enters/ Exits the System Map
F2	Enters/ Exits the Galactic Map
F3	Enters/ Exits the Ship Status
F4	Enters/ Exits the Target Ship Status
F5	Enters/ Exits the Tactical Screen
F8	Star System Editor (Refer to Appendix L)
F12	SAVE GAME
H	Toggles the Help Menus
SPACE BAR	PAUSE GAME
<	Take Screenshot prior to Windows being drawn. Placed in 'snaps' directory.
>	Take Screenshot after Windows being drawn. Placed in 'snaps' directory.
LEFT-ALT	Show Labels

The 'Main Screen' represents the default and is entered whenever one of the other screens is left.

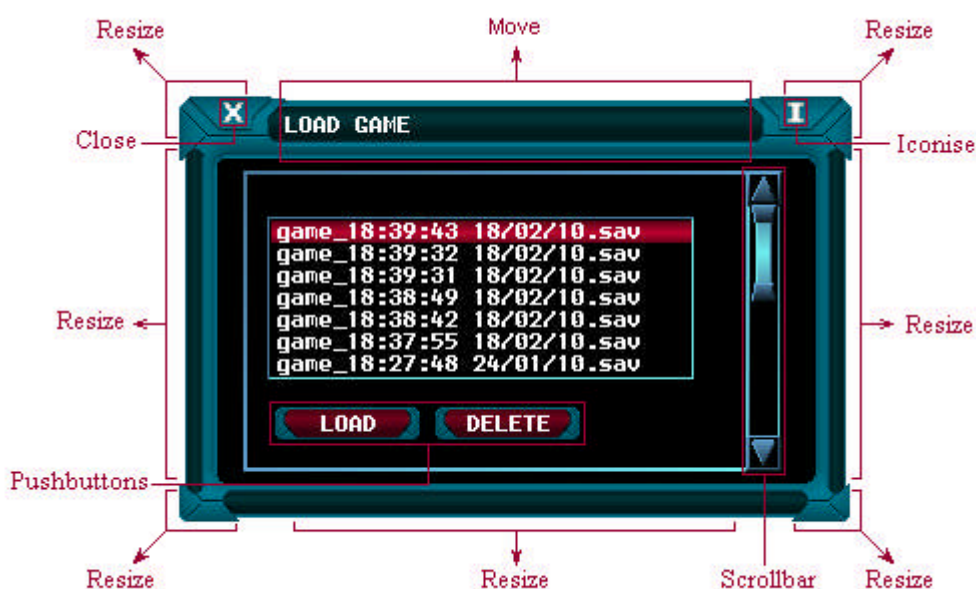
The 'Save Game' option can be selected at any point during the game and does not require any further user input. It is described in detail in Section 2.1

The Help Menus can also be activated at any time and provide information with regard to Spacecraft, Weapons and general game operation.

The 'Pause Game' is of special note because it effectively freezes all 3rd party actions, but allows the user to continue to access and manipulate items without restriction.

Screenshots will be placed in the 'snaps' directory.

All screens utilise a 'windows' style interface and the attached illustration describes their general presentation and operation.



1.1 MAIN SCREEN

The main screen represents the view from the cockpit of your chosen Spacecraft and Figure 1.1 displays a typical scene of an approaching Space Station. The blue gun sights lie in the centre of the screen and directly below them is located the Radar Scanner. The Instruments panel and targeting window lie to the left, whilst the Weapons Management System is on the right



Figure 1.1

Each of the four major windows can be repositioned anywhere on the screen by de-activating the 'mouse-control'. To achieve this, either hold down the 'shift keys' or the 'Right Mouse Button' and then use the 'Left Mouse Button' to select the window and move it. All the windows can be iconised, but none of them can be closed.

The Instruments Panel is shown below



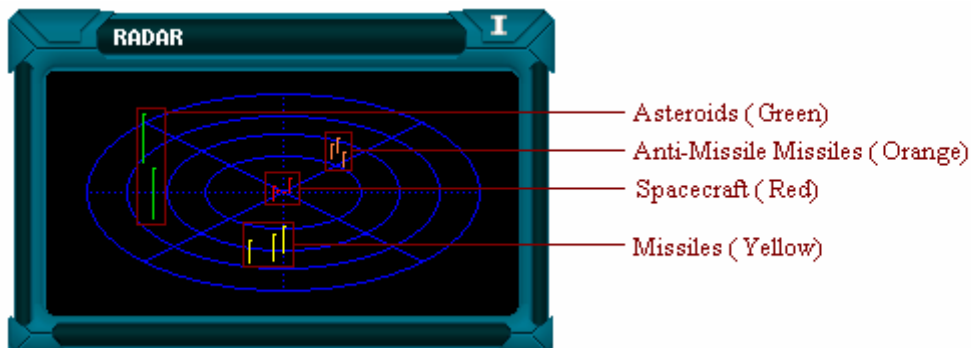
The top area represents a damage report, which gives a summary of the Shield and Component Status.

While the Shield Bar is fully extended then full protection against Laser Weapons is afforded. Sometimes a numeral will also appear on the right of a fully extended bar which represents an 'over-booking' factor. The figure of '+3' in this example means that the shields are at '+300%' strength. Refer to Section 5.1 for a detailed description of how Shields work.

The Damage Report is listed in terms of major systems on a typical ship. Thus there are separate bars for the Engines, Wings and Critical Components. In general several bars will appear per group representing individual subsets of components. If these bars extend into a red area then the item is in danger of being destroyed.

The Velocity bar and Altimeter appear beneath the Status area.

The Radar Scanner displays objects in your immediate vicinity such that your Ship is located at its centre. Objects in front of the Ship will appear in the top quadrant whereas objects behind it appear in the bottom quadrant. Similar rules apply to objects to the left and right of the vessel. In order to convey the height or depth of the object then a line is extended from the object to the plane of the scanner, the longer the line the greater its height or depth relative to your position.



The Targeting window provides information on the selected target which can be a Ship, Space Station, Planet or City. The top area displays the selected object itself and directly below this is a description of its most important aspects.



The Ship that has been targeted in the window on the left is a 'Reaver' with a registration of 'ISH-696'. Its range and velocity are also shown together with a shield bar and damage report.

Notice that at least one engine has been destroyed (the extended line) and that the others have also been severely damaged. In addition damage to the wings and critical systems has also been incurred.

The Weapons Management window as shown in the accompanying illustrations allows the contents of Missile Magazines to be inspected, the cannons to be configured and the turrets targeting policy to be set. Selecting one of the three buttons at the top of the window will cause the relevant information to be displayed.



If the 'Turrets' option is selected then the registration of each spacecraft that is locked into the tracking computer of each of the available turrets is displayed. Also the targeting options described in the following table can also be specified.

TURRET TARGETING OPTIONS	
DISABLED	Turrets are disabled
DEFENSIVE	Turrets will target any ship that has caused damage to your spacecraft
SELECTED	All Turrets will target the currently selected spacecraft.
INDEPENDENT	Clicking the relevant turret button (e.g. Class 5 Upper) will cause that cannon to target the currently selected spacecraft.

Figure 1.1.1 displays the Long Range Scanner that can be activated via the 'L' key. This displays all the Ships that are present within an extended area surrounding the pilot's spacecraft and can be enhanced to cover the entire current System. The top left hand box corresponds to a list of the ships, whereas to the right lies an area in which the selected vessel is displayed. The bottom left hand area of the window allows the orientation of the selected object to be manipulated. Remember that in order to manipulate items in the Long Range Scanner window then Mouse Control must be suppressed using the 'Shift' keys or 'Right' Mouse button.

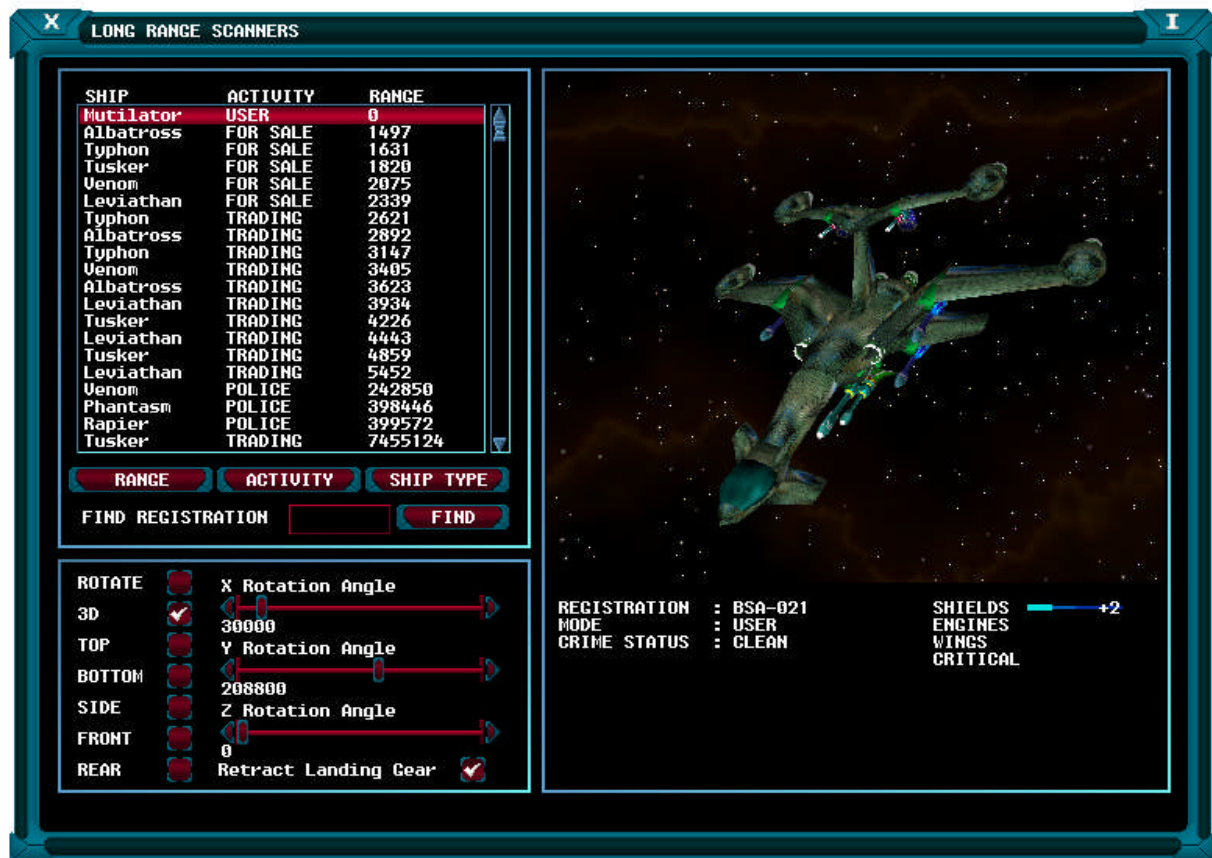


Figure 1.1.1

The outstanding Contracts window as shown in Figure 1.1.2 can be displayed using the 'C'. The list on the left can be used to select an item such that its details will be displayed on the right.

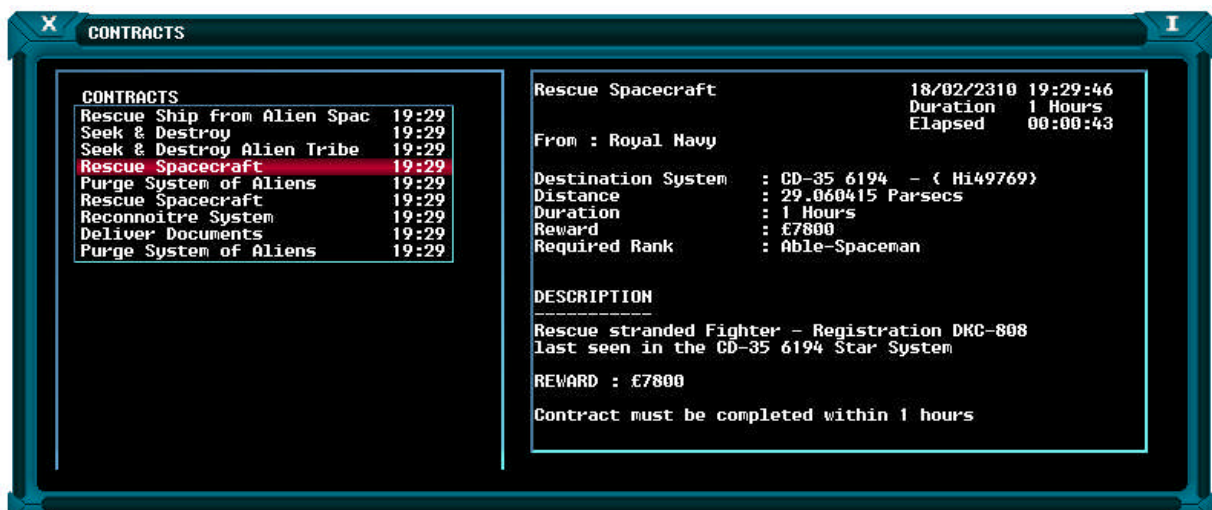


Figure 1.1.2

Figure 1.1.3 displays the message window. Its structure and operation are identical to that of the contracts window and this example shows an itemised Salvage Statement received from a local Space Station.

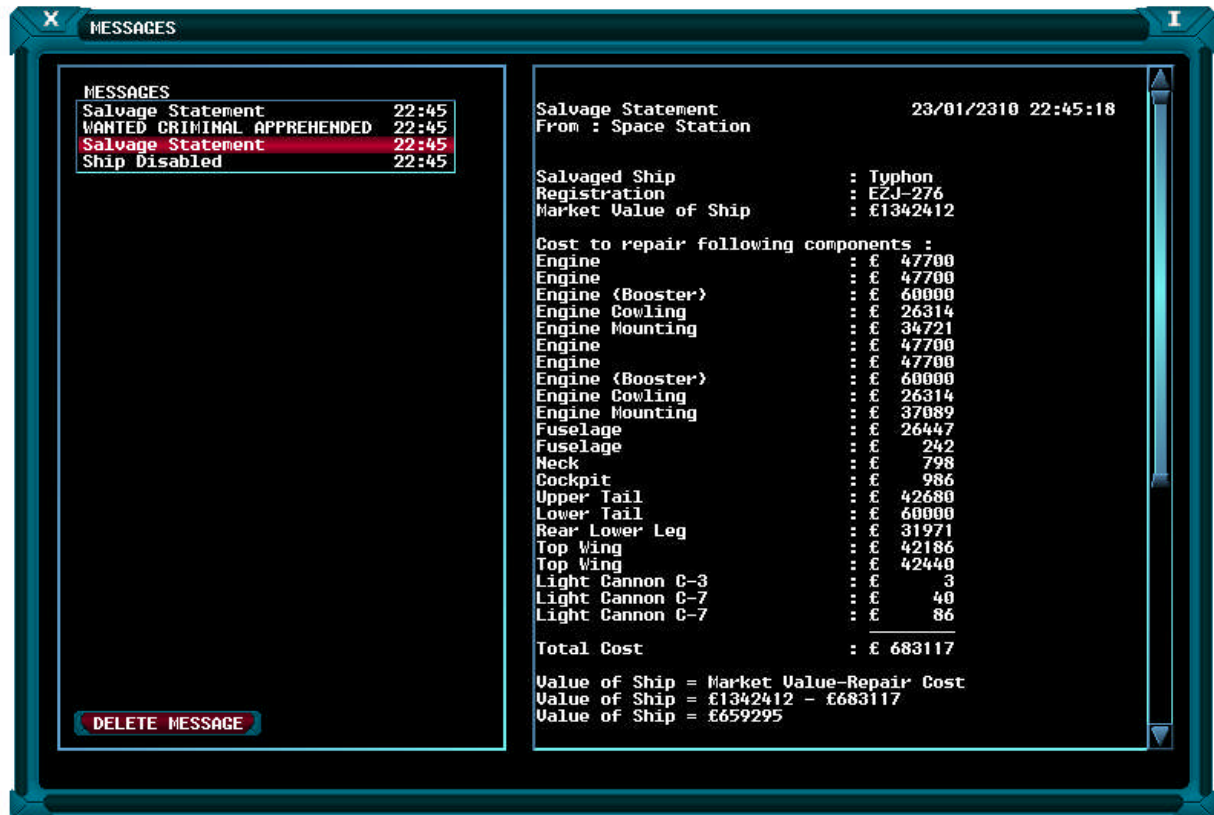


Figure 1.1.3

MAIN SCREEN CONTROL KEYS

CONTROL KEYS	
1 - 5	Fire Missile from Magazine 1 - 5
W	Open Wormhole to selected Star System
A	Engage / Disengage Autopilot
G	Gain Altitude (Autopilot mode)
+	Accelerate
-	Decelerate
SHIFT RIGHT MOUSE BUTTON	Suppresses Mouse as a Ship Control. Allows windows and objects to be selected.
Q or LEFT ARROW	Yaw/ Roll anticlockwise
E or RIGHT ARROW	Yaw/ Roll clockwise
D	Dock with Space Station or Land on Planet Surface/ City Landing Pad
L	Open/ Close Long Range Scanner Window
M	Open/ Close Message Window
C	Open/ Close Contracts Window
U	Undock or Take Off
R	Open/ Close Observation Camera (provided unit has been purchased)
[(open square brackets)	Activate Tractor Beam
] (close square brackets)	De-activate Tractor Beam
S	Target Space Station – (+SHIFT Selects nearest)
V	Target Vessel (i.e. Space Craft) – (+SHIFT Selects nearest)
J	Target Debris (i.e. Junk) – (+SHIFT Selects nearest)
T	Target Asteroid – (+SHIFT Selects nearest)
P	Target Planet – (+SHIFT Selects nearest)
O	Target City on Target Planet – (+SHIFT Selects nearest)

1.2 TACTICAL SCREEN

The tactical screen gives a 3rd person view of your Spacecraft. Its primary role is to allow gun turrets and Squadron members to be controlled. Figure 1.2 shows an example screen where your Spacecraft is located in the centre surrounded by members of its squadron. The screen is similar to the main screen except that a 'Command Console' is also present which allows instructions to be issued to the squadron members.



Figure 1.2

Referring to Figure 1.2.1, the command console displays a status report for each member of the squadron. The members can be selected by 'clicking' on the report area causing them to be highlighted. They can be deselected by 'clicking' on them a second time. The buttons immediately to the right allow all members to be selected or deselected and the buttons to the right of these issue commands.

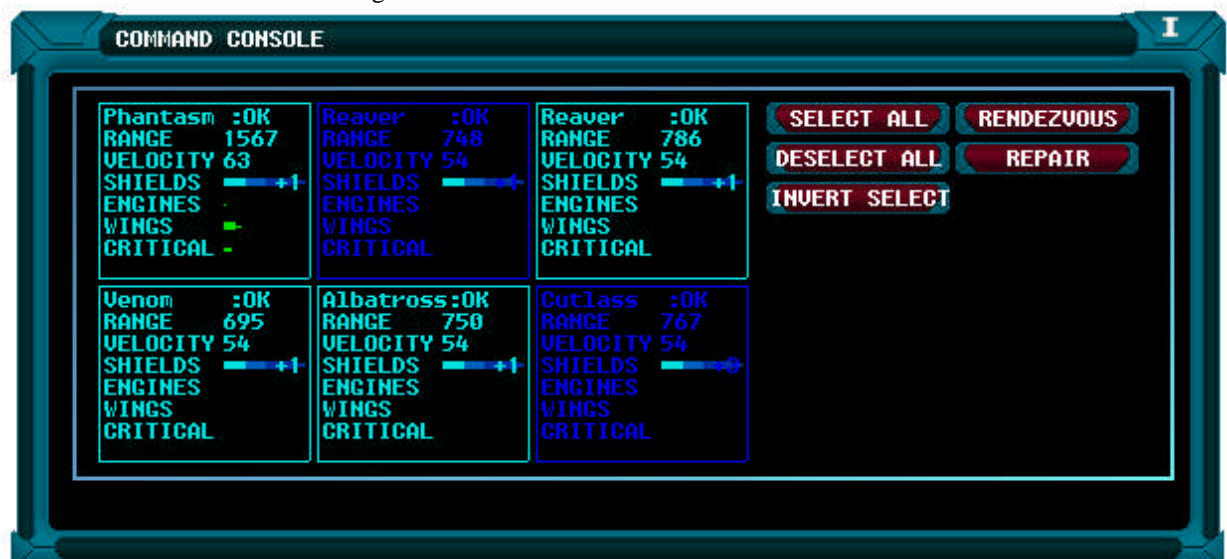


Figure 1.2.1

COMMAND CONSOLE : COMMANDS	
RENDEZVOUS	Instruct selected Ships to assemble in Squadron formation
REPAIR	Instruct selected Ships to head for nearest Space Station for repairs.
ATTACK	Instruct selected Ships to attack the current target.
SALVAGE	Instruct selected Ships to salvage the target wreckage.

CONTROL KEYS	
PAGE UP	Zoom In towards Ship
PAGE DOWN	Zoom Out away from Ship
ARROW UP	Rotate Upward about Ship
ARROW DOWN	Rotate Downward about Ship
ARROW LEFT	Rotate Anti-Clockwise about Ship
ARROW RIGHT	Rotate Clockwise about Ship
SHIFT	Increase speed of 'zoom' and 'rotation'
1 - 5	Fire Missile from Magazine 1 - 5
W	Open Wormhole to selected Star System
A	Engage / Disengage Autopilot
+	Accelerate
-	Decelerate
D	Dock with Space Station or Land on Planet Surface/ City Landing Pad
L	Open/ Close Long Range Scanner Window
M	Open/ Close Message Window
C	Open/ Close Contracts Window
U	Undock or Take Off
R	Open/ Close Observation Camera (provided unit has been purchased)
[(open square brackets)	Activate Tractor Beam
] (close square brackets)	De-activate Tractor Beam
S	Target Space Station – (+SHIFT Selects nearest)
V	Target Vessel (i.e. Space Craft) – (+SHIFT Selects nearest)
J	Target Debris (i.e. Junk) – (+SHIFT Selects nearest)
T	Target Asteroid – (+SHIFT Selects nearest)
P	Target Planet – (+SHIFT Selects nearest)
O	Target City on Target Planet – (+SHIFT Selects nearest)

1.3 STATUS SCREEN

The status screen as shown in Figure 1.3 displays the condition of your Spacecraft's mechanical components together with the contents of its cargo bay and missile magazines. The required details can be accessed via the menu bar at the top of the screen and the table at the foot of this page describes each of the status windows.

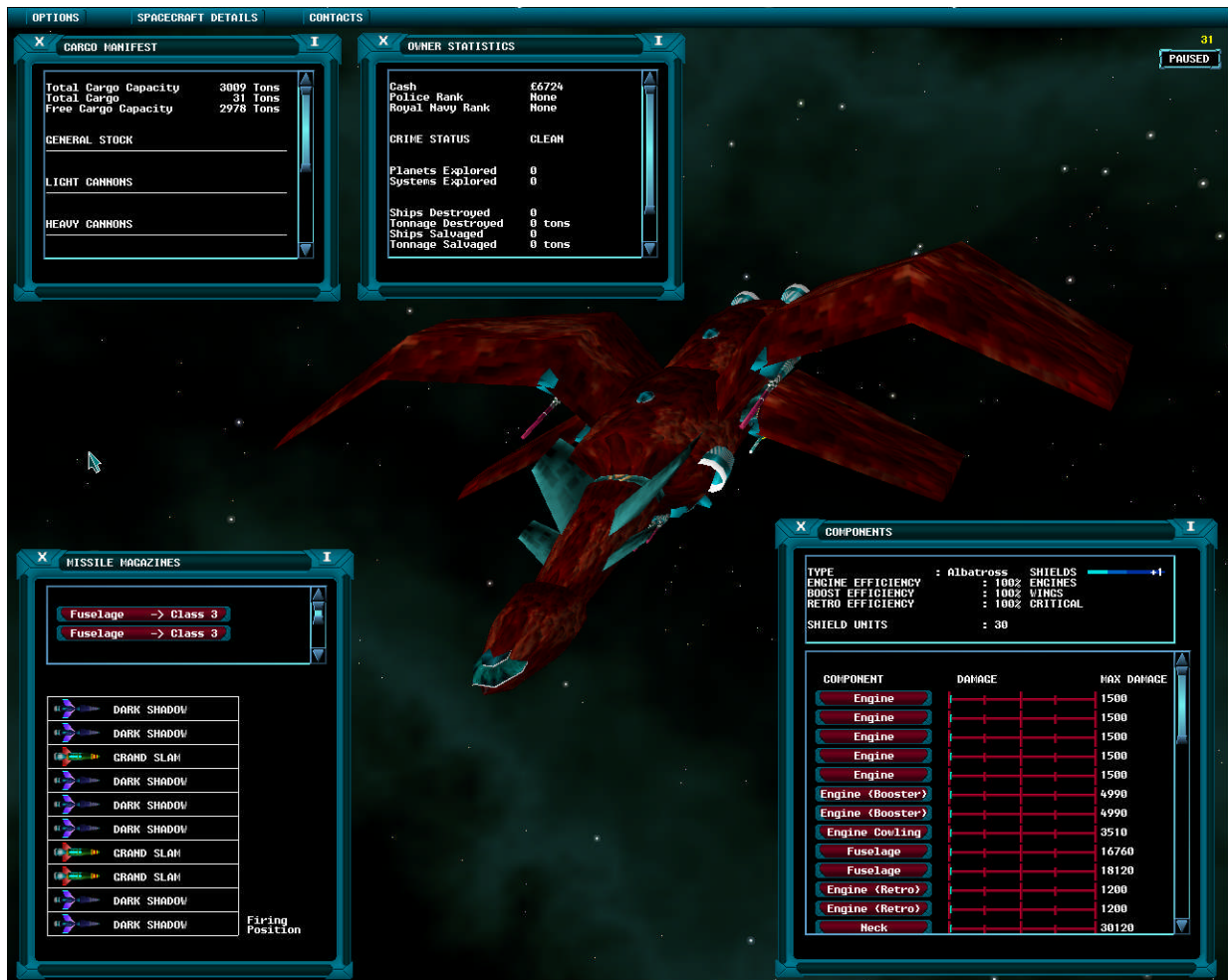


Figure 1.3

STATUS WINDOWS		
VIEW OPTIONS	V	Allows the orientation of the displayed craft to be manipulated.
COMPONENTS	S	Displays a summary of the spacecraft's overall state at the top of the window together with a detailed damage report below it.
MISSILE MAGAZINE	W	Contents of the spacecraft's missile magazines.
CARGO MANIFEST	K	Contents of the Spacecraft's hold.
OWNER DETAILS	O	Details of the Spacecraft's owner including cash reserves and criminal record.

1.4 STAR SYSTEM MAP

The Solar System Map, as illustrated in Figure 1.4, displays the planetary bodies of the current Star System that you occupy. The main star is shown in the centre of the screen and the planets that orbit it are displayed in concentric circles surrounding it. The System Window that is shown towards the top of the screen as also detailed in Figure 1.4.1 provides an overview of each of the celestial bodies and their orbital positions relative to each other.



Figure1.4



Figure1.4.1

Left clicking on a planet or the central sun in either the main screen or system window will cause the focus to shift to that object. Double clicking on it will cause the 'Selected Planetary Body' window to appear as shown in Figure 1.4.2. This window displays various information concerning the selected object.

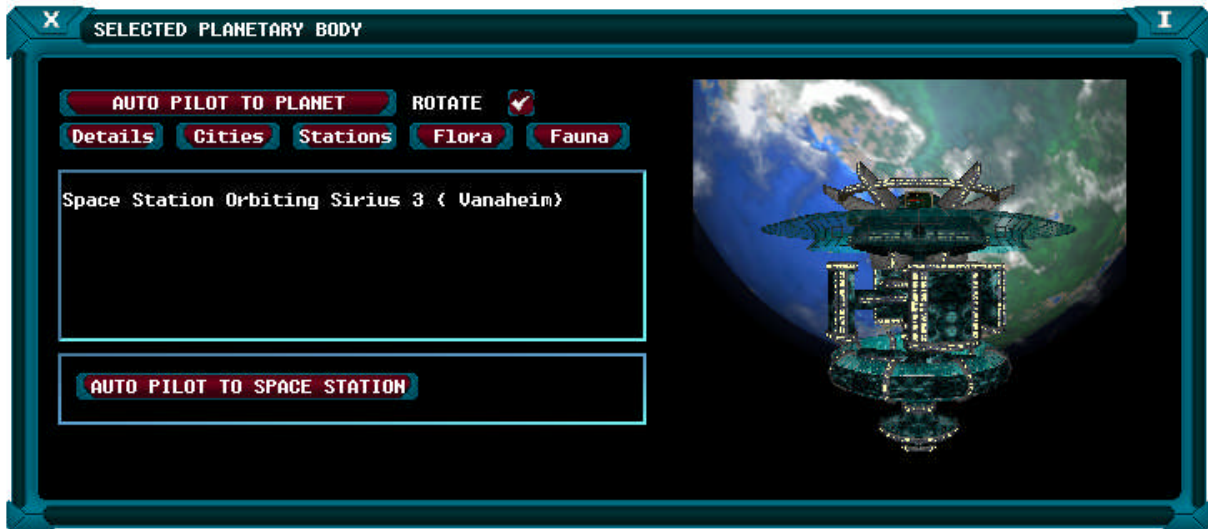


Figure 1.4.2

It is possible to manipulate the viewing position via the keyboard arrow keys or by holding down the middle mouse button.

The Solar System Map also allows any position on a non gaseous planet's surface to be selected as an auto pilot destination. Simply select the desired planet and zoom into it using the mouse scroll wheel or the 'Page Up' key. Once a sufficient level of detail has been achieved, 'left click' on the required point and engage the auto pilot using the 'a' key.

Selecting 'Options' via the 'Main' button on the menu bar will bring up the Options window as illustrated in Figure 1.4.3.

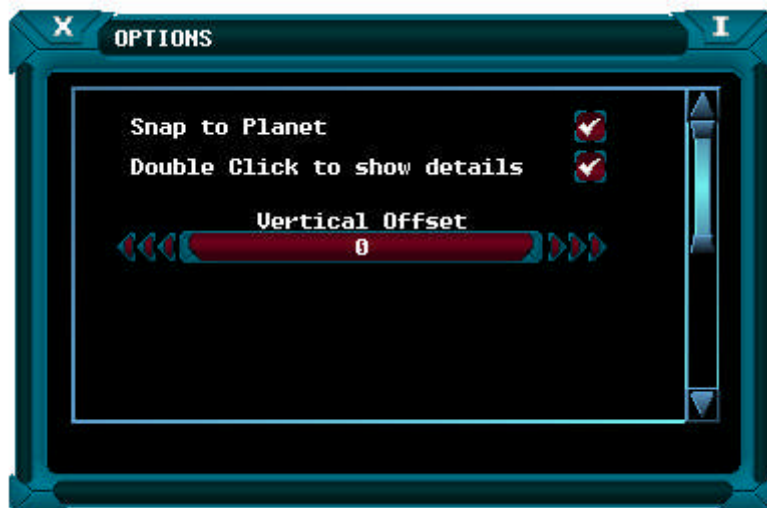


Figure 1.4.3

Table 1.4 describes the available options.

TABLE 1.5	
SNAP TO PLANET	Causes screen to focus on the selected object. If the option is disabled then the focus will remain on the central star.
DOUBLE TO SHOW DETAILS	Double clicking on an object causes the selected planetary body window to be displayed.
VERTICAL OFFSET	Adjusts the vertical position of the central star.

STAR SYSTEM MAP CONTROL KEYS

CONTROL KEYS	
PAGE UP	Zoom In towards selected Planet
PAGE DOWN	Zoom Out away from selected Planet
ARROW UP	Rotate Upward about selected Planet
ARROW DOWN	Rotate Downward about selected Planet
ARROW LEFT	Rotate Anti-Clockwise about selected Planet
ARROW RIGHT	Rotate Clockwise about selected Planet
RIGHT MOUSE KEY	Re-lock to central Sun and close 'Selected Planetary Body' Window
L	Open/ Close Long Range Scanner
M	Open/ Close Message Window
C	Open/ Close Contracts Window

1.5 GALACTIC MAP

Figure 1.5.1 shows the Galactic Map which provides the means of navigating between Star Systems. The System in which you currently reside is located in the centre of the screen and the blue circle represents the scanning range. Stars which lie within this scanning range are marked with a stalk between the plane of the scanner and the star itself in order to convey an impression of its location relative to the current position. As the mouse pointer is moved across the screen a description of the Star that it hovers over will appear.

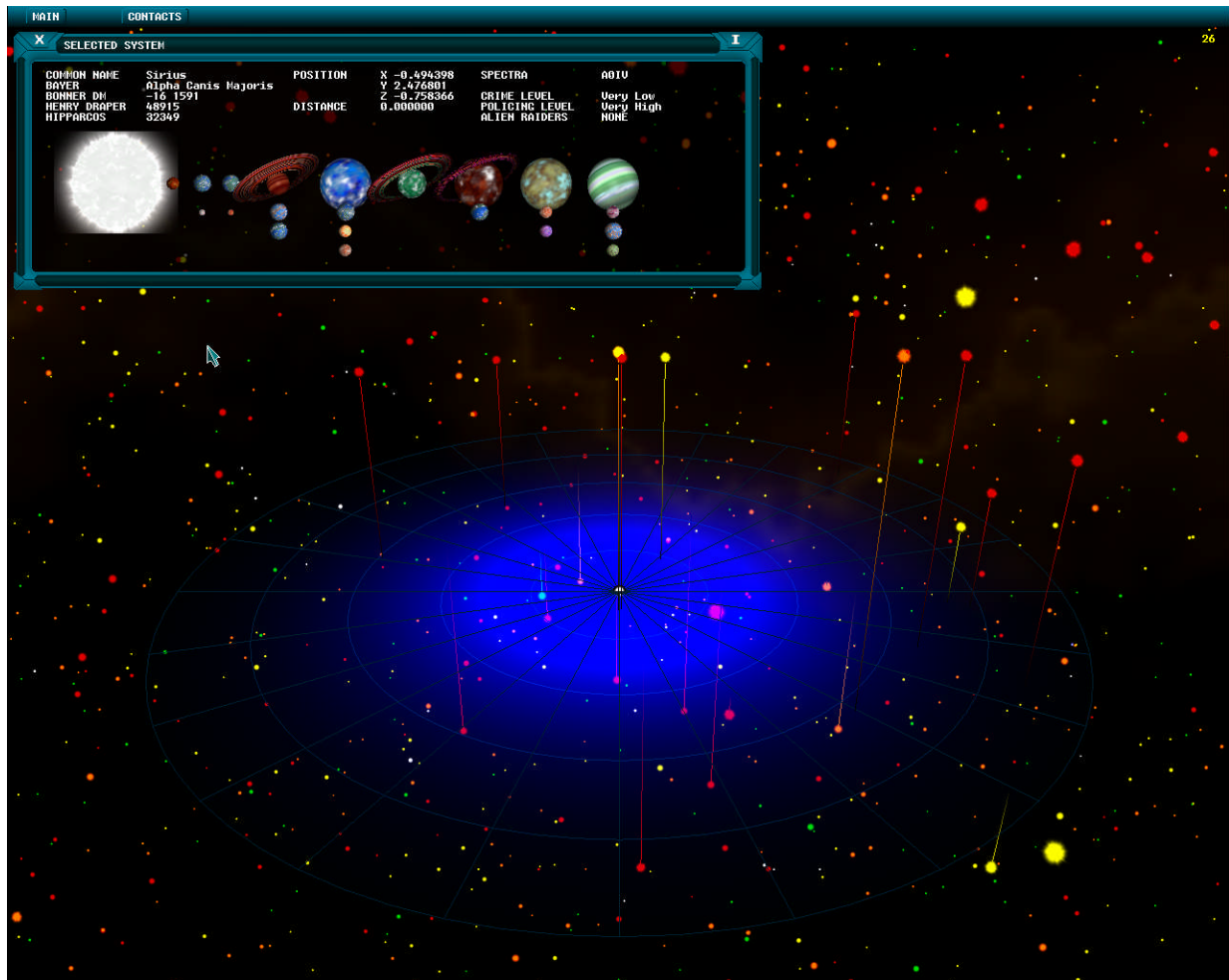


Figure 1.5.1

It is possible to change the view position by use of the keyboard arrow keys or by holding down the middle mouse button.

Left clicking on a star will select it and a second blue scanner circle will appear that is centred on that position. At the same time a window will appear as shown in Figure 1.5.2a which provides details of the System.

The 'Selected System' window will display the position, distance and basic details of the Star. Below this information lies a graphical representation of the planets that orbit the star and left clicking on any of these bodies will open another window (Figure 1.5.2b) that provides details concerning the object that has been selected.

Once a System that is within range has been selected it is possible to enter it by opening a Wormhole using the 'W' key. However if your spacecraft does not carry sufficient Deuterium fuel to open the Wormhole than an error message will be displayed informing you of the problem.



Figure 1.5.2a

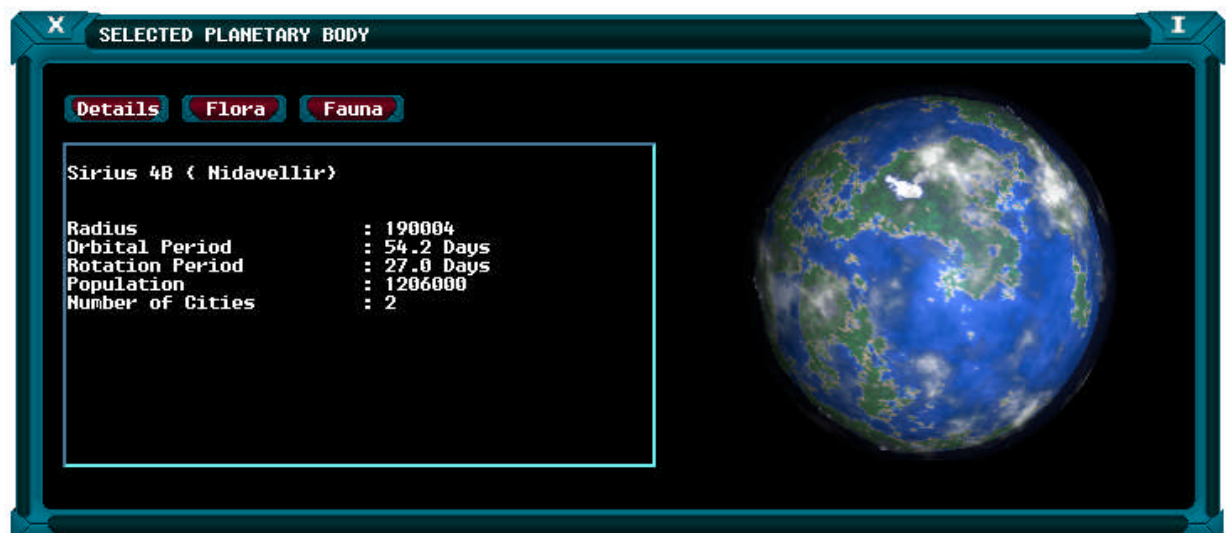


Figure 1.5.2b

Selecting 'Options' via the 'Main' button on the menu bar will bring up the Options window as illustrated in Figure 1.5.3.

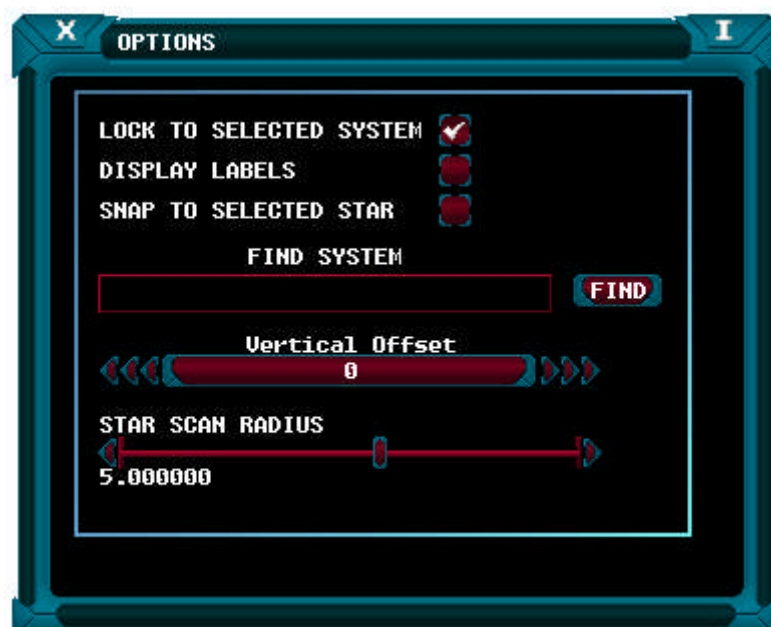


Figure 1.5.3

Table 1.5 describes the available options.

TABLE 1.5

LOCK TO SELECTED SYSTEM	Selects the basic control method for moving within the Galactic map screen. Enabling the Lock will cause movement to be relative to the selected Star, whilst disabling it will activate a 'free-flight' mode.
DISPLAY LABELS	Displays descriptive labels of the Stars which lie within the scanners perimeter. Holding down the 'Left-Alt' key will also provide this option.
SNAP TO SELECTED STAR	Causes the focus to 'snap' to the selected star rather than the current one.
VERTICAL OFFSET	Adjusts the vertical position of the central star.
STAR SCAN RADIUS	Sets the radius of the 'selected' and 'current' star scanners. The scanner radius is measured in parsecs and shrinking the radius can be used to de-clutter the screen.
FIND SYSTEM	Can be used to find a specific Star System within the Galactic map. The name of the star can be entered as a common name, Bayer, Flamsteed, Durchmusterung or Hipparocos catalogue number. The search will automatically determine the format.

GALACTIC MAP CONTROL KEYS**CONTROL METHOD 1 : LOCK TO SELECTED SYSTEM**

PAGE UP	Zoom In towards selected Star
PAGE DOWN	Zoom Out away from selected Star
ARROW UP	Rotate Upward about selected Star
ARROW DOWN	Rotate Downward about selected Star
ARROW LEFT	Rotate Anti-Clockwise about selected Star
ARROW RIGHT	Rotate Clockwise about selected Star
RIGHT MOUSE KEY	Re-lock to current Star System

CONTROL METHOD 2 : UNLOCKED

PAGE UP	Move Forwards
PAGE DOWN	Move Backwards
ARROW UP	Rotate Upward
ARROW DOWN	Rotate Downward
ARROW LEFT	Rotate Left
ARROW RIGHT	Rotate Right

GENERAL CONTROL KEYS

SHIFT	Slow Movement
LEFT-ALT	Show Labels
RIGHT MOUSE KEY	Close 'Selected Star' Window
F	Show Fuel Range
W	Open Wormhole to selected Star System
L	Open/ Close Long Range Scanner
M	Open/ Close Message Window
C	Open/ Close Contracts Window

SECTION 2: OPTIONS

The options menu, as shown in Figure 2, can be activated at any time using the 'escape' key. The buttons on the left allow the Video, Music and general preferences to be configured, whilst those on the right allow saved games to be loaded or the application to be restarted.

The game can be resumed either by pressing the 'escape' key a second time or by pressing the 'Resume' button.



Figure 2

The rest of this section describes each of the main options in more detail.

2.1 SAVING AND LOADING GAMES

The game can be saved at any time by pressing the 'F12' function key which will automatically create a suitable identification based upon a timestamp, screen dump and name of the current star system. Figure 2.1 illustrates the structure of the 'load' menu which can be accessed from the main options window.

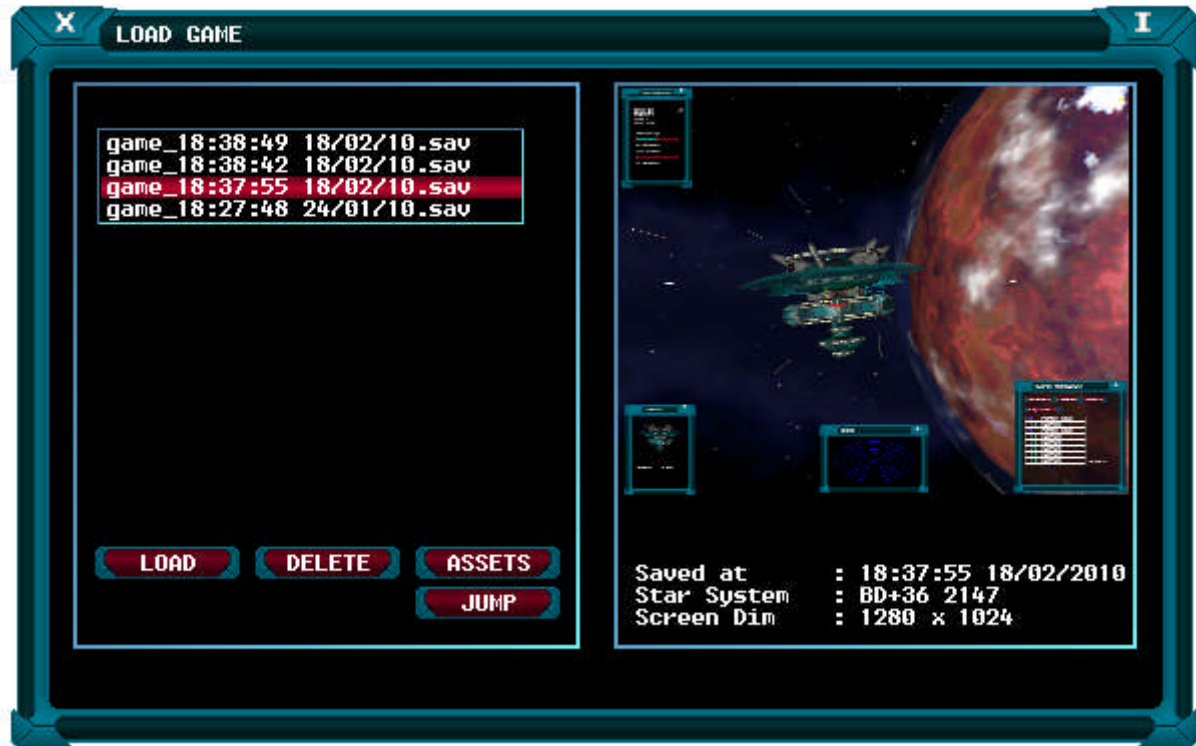


Figure 2.1

The area on the left lists all the saved games where the file name adopts the following format:

game_<TIME> <DATE>.sav

The time is based on the 24 hour clock and the data adopts the standard UK format of 'day/month/year'.

A screen dump of the selected file appears on the right of the screen.

If a file is deleted then it is moved into the 'Recycle Bin' so that it can be restored if a mistake has been made. The 'Recycle Bin' can also be accessed from the main options menu and it should be purged periodically to prevent the Hard Disc from filling up.

The Assets button allows cash to be transferred from a saved game and is intended as a fallback if the format of the file is incompatible with the current release of the Game. It should be noted however that this option will not work with files created by releases prior to 1.2.

If the game fails to save then a visual notification will be posted and the table below describes the possible reasons.

REASON	DESCRIPTION
READ ONLY ACCESS	The 'save' directory does not possess 'write' access. The saved games are held in the 'user/saves' directory of the games main directory. Use Windows Explorer to open the properties menu for the directory and ensure that 'Read-only' is not selected.
LACK OF DISK SPACE	There is insufficient memory on the hard disk. Either clean-up the hard disk or delete some of the saved games and then purge the games recycle bin.

2.2 PREFERENCES

Figure 2.2 illustrates the ‘preferences’ menu which can be used to adjust the appearance and speed of the game. Table 2.2 describes the meaning of the options.



Figure 2.2

TABLE 2.2	
AMBIENT LIGHT	Adjusts the level of background lighting and will affect the brightness of objects that lie in shadow. The adjustment is dynamic and its effects can be seen as the slider is adjusted.
NEBULA LIGHT	Adjusts the level of brightness of the background Nebula. The adjustment is dynamic and its effects can be seen as the slider is adjusted.
MIN VEGETATION SIZE	Adjusts the size of visible vegetation on a planets surface. A higher value will reduce the amount of vegetation that is rendered and will consequently increase the speed of the game. The setting is only noticeable close to the surface of a life supporting planet and the adjustment takes immediate effect.
MIN ANIMAL SIZE	Adjusts the size of visible fauna on a planets surface. A higher value will reduce the number of animals that are rendered and will consequently increase the speed of the game. The setting is only noticeable close to the surface of a life supporting planet and the adjustment takes immediate effect.
VEGETATION CREATE	Adjusts the amount of vegetation that is created during a single iteration of the planet generation routines. A high value will place a greater load on the CPU, whilst a low one may cause

	the generation of a planets fractal landscape to lag.
ASTEROID CREATE	Adjusts the number of asteroids that are created during a single iteration of the planetary ring generation routines. A high value will place a greater load on the CPU, whilst a low one may cause the generation of a planets asteroid field to lag.
TEXTURE CREATE	Adjusts the rate at which the Fractal Texture Map is created during the initial approach to a new planet A high value will place a greater load on the CPU, whilst a low one may cause the formation of a planetary fractal to be delayed.
HIGH ALTITUDE DETAIL	Enables/ Disables detailed fractal texture maps when above the atmosphere. Disabling this option may be necessary if an older video card is used.
HIGH RES TEXTURE	Enables/ Disables Hi Resolution Texture Maps. Enabling this option will fix the distortion that occurs particularly at the planets poles and should improve the low altitude appearance of the planet. However it requires increased video memory and the fractal will take longer to generate.
RENDER CLOUDS	Enables/ Disables the rendering of 3D clouds. Disabling this option may be necessary if an older video card is used.
PASSIVE ALIENS	If selected then Aliens will not attack your spacecraft if unprovoked.
PASSIVE PIRATES	If selected then Pirates will not attack your spacecraft if unprovoked.
SPEED MULTIPLIER	Increases/ Decreases the speed of the Spacecraft in the game.
ANIMATED ADVERTS	Enables / Disables the animation of the advertisements that appear on Space Stations. Disabling the option will cause the adverts to become static, but it may reduce the loading placed on the Graphics card.
ARCADE MODE	The Arcade Mode activates a 3 rd person perspective of your spacecraft where the position of the camera behind it can be controlled by the Height and Distance Sliders.

2.3 WINDOWS

The appearance of the Windows that are used within the game can be adjusted via the 'Windows Options' menu as illustrated in Figure 2.3.



Figure 2.3

The colour of the frame, central 'fill' area, buttons and text can all be adjusted dynamically using the sliders, whilst the 'Darkening Factor' is used to set the translucency of the windows. The timeouts of the error and information windows are also configurable and the Save option should be selected in order to retain the settings for when the game is next executed.

2.4 VIDEO

The Video Options window is illustrated in Figure 2.4.

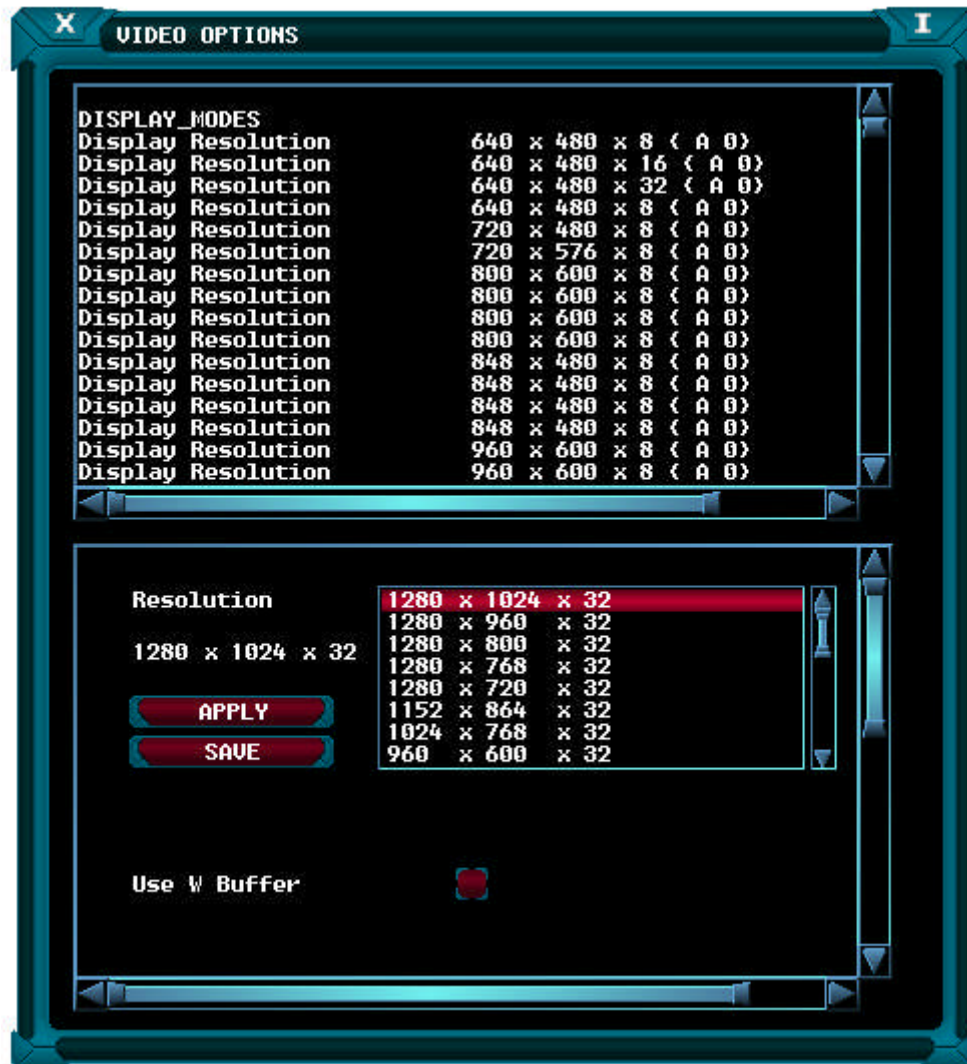


Figure 2.4

The top half of the screen is simply a readout of the Video Cards characteristics and is included for information only.

The resolution can be selected via the scrolling list of available options and the 'apply' button will cause the desired setting to be activated. It should be noted that on Graphics Cards with limited memory then this may take some time.

The 'W Buffer' option selects W buffering as opposed to standard Z buffering and in theory should produce superior results. A W/ Z buffer is used to remove pixels that are obscured by others that are closer to the observer. A Z buffer works well for objects that are relatively close to the viewer and is generally fine for games such as first person shooters. For applications that need to compute large distances, such as space games then a Z buffer will tend to struggle and artefacts can occur. In principle the W buffer should work better where larger distances are involved, however in practice the results tend to be marginal.

2.5 INPUT

The Input Options window allows the operator to select and adjust mechanism for controlling the game. Figure 2.5a illustrates the structure of the screen.



Figure 2.5a

The upper box simply lists the Input devices that the application has found, whereas the lower box provides the configuration options for controlling the game.

The following Six control methods are supported:

MOUSE PITCH+ROLL

The Ship is controlled by positioning the mouse pointer relative to the centre of the screen. Moving the pointer above or below the sights will cause the ship to 'pitch', whereas moving it to the left or right of them will cause the ship to 'roll' clockwise or anti-clockwise. Placing the pointer in the centre of the sights will cause the ship to fly straight. The 'Q' + 'E' or 'LEFT ARROW' + 'RIGHT ARROW' keys can be used to control the 'yaw'.

MOUSE PITCH+YAW

Similar to 'Mouse Pitch+Roll' except that the mouse controls 'yaw' and the keyboard controls the 'roll'

MOUSE FLY TO POINTER

The Ship flies towards the position that the mouse pointer hovers over. If this option is selected then it is recommended that the mouse is desensitised and a value of 20 is a recommended starting point. In addition to the mouse the 'Q' + 'E' or 'LEFT ARROW' + 'RIGHT ARROW' keys can be used to control the 'roll'.

MOUSE SCROLLING

Spacecraft is controlled by moving the mouse in the desired direction. If this option is selected then it is recommended that the mouse sensitivity is decreased and the 'Control via Right Click' selected. In addition to the mouse the 'Q' + 'E' or 'LEFT ARROW' + 'RIGHT ARROW' keys can be used to control the 'roll'.

JOYSTICK PITCH+ROLL

Moving the Joystick left or right 'rolls' the ship, whereas moving it up or down controls the 'pitch'. On more advanced joysticks the device can also be twisted to control 'yaw'. In addition to the joystick the 'Q' + 'E' or 'LEFT ARROW' + 'RIGHT ARROW' keys can be used to control the 'yaw'.

JOYSTICK PITCH+YAW

Similar to 'Joystick Pitch+Roll' except that the joystick controls 'yaw' and the keyboard controls the 'roll'

JOYSTICK PITCH+ROLL+YAW

Moving the Joystick left or right 'rolls' the ship, whereas moving it up or down controls the 'pitch'. The Ship will 'yaw' based on the degree of 'roll' and 'pitch'.

Figure 2.5b illustrates how the terms 'roll', 'yaw' and 'pitch' relate to your spacecrafts attitude. The joystick also shown in the diagram describes how its controls can be used to effect these changes.

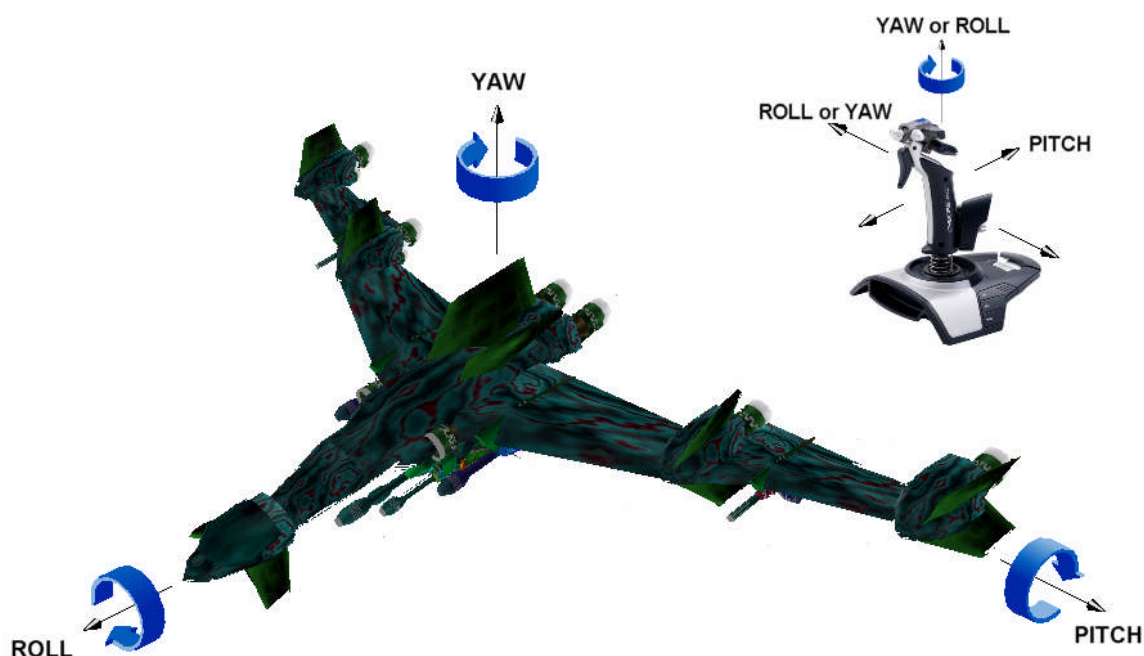


Figure 2.5b

The following tables describe the secondary control options.

TABLE 2.5a : GENERAL CONTROL SETTINGS	
INVERT PITCH	Inverts pitch so that the mouse or joystick control is reversed.
INVERT YAW	Inverts yaw so that the keyboard, mouse or joystick control is reversed.
INVERT ROLL	Inverts roll so that the keyboard, mouse or joystick control is reversed.

VELOCITY vs. TURN RATE	Slider used so that the rate of turn increases as the velocity increases. A value of '1' effectively disables this setting so that the velocity has no bearing on the rate of turn.
ATMOSPHERIC AUTO-RIGHT	Causes the spacecraft to fly level to the ground when within the atmosphere of a planet. This setting may be useful when 'roll' is not directly controlled by the mouse or joystick.

TABLE 2.5b : MOUSE CONTROL SETTINGS	
MOUSE DEAD ZONE	Number of pixels in the centre of the screen which will cause the Ship to fly straight.
MOUSE SENSITIVITY	Controls how sensitive of the mouse is. Low values are more sensitive than high values. The 'Fly to Pointer' typically requires a less sensitive setting and a value of 20 represents a good default.
MOUSE SENSITIVITY	Controls how sensitive of the mouse wheel is. High values are more sensitive than low values and a value of '0' will effectively disable the mouse wheel.
DOUBLE CLICK SPEED	Determines the sensitivity of the mouse double click feature
CONTROL VIA RIGHT CLICK	If this option is selected then the right mouse button must be pressed in order to control the spacecraft.
INVERT MOUSE WHEEL	Inverts the mouse wheel rotation so that its control option is reversed.
WHEEL POV	Mouse wheel controls the sideways point of view. The right mouse button will re-centre the POV.
WHEEL THROTTLE	Mouse wheel controls the throttle
WHEEL ROLL/ YAW	Mouse wheel controls the yaw or pitch

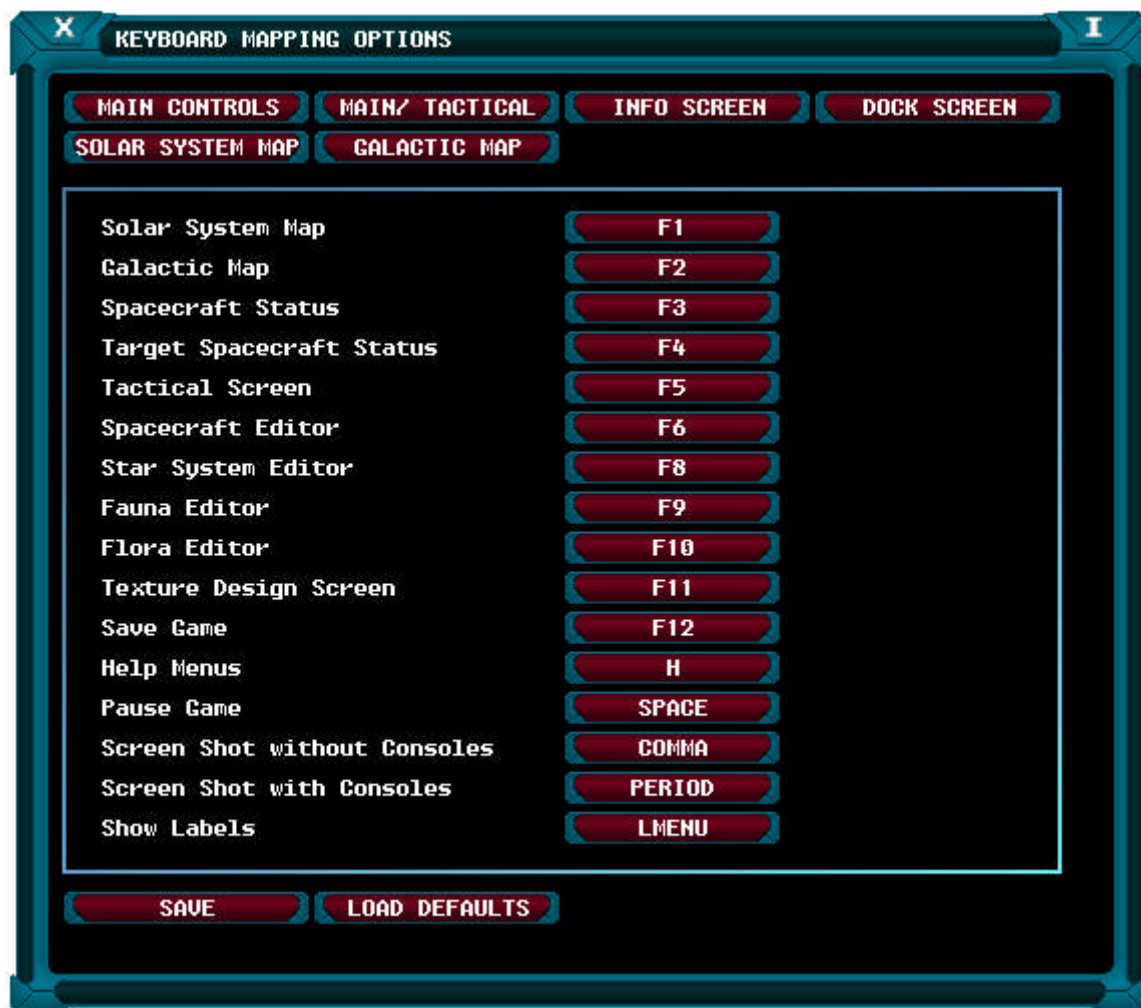
TABLE 2.5c : JOYSTICK CONTROL SETTINGS	
JOYSTICK DEAD ZONE	This represents a measure in degrees of the neutral area in the centre of the Joystick. The default value of 10 degrees means that the stick must be moved by this amount before it produces any input data.
JOYSTICK SENSITIVITY	Adjusts the sensitivity of the Joystick
TWIST DEAD ZONE	If the joystick can be 'twisted' then this controls the neutral area before the twist will take effect.
TWIST SENSITIVITY	Adjusts the sensitivity of the Joystick twist, if 'twist' is supported.
POV SENSITIVITY	Controls the 'Point of View' Sensitivity for the POV hat on the joystick. A value of zero will disable the POV.
JOYSTICK THROTTLE	If the joystick possesses a throttle control then this can be used to control the velocity.
THROTTLE SENSITIVITY	Controls the 'throttle' Sensitivity if the joystick possesses a throttle lever.

TABLE 2.5d : FORCE FEEDBACK	
OVERALL FORCE	Overall strength of the Force produced by the device.
SPRING STRENGTH	Controls the force with which the device will attempt to re-centre itself.
FRICTION CONTROL	Controls how resistant the Joystick feels. Note that this setting can cause interference if the Spring Strength is greater than zero.
REFRESH CONDITIONS	Reapplies the configuration to the device.
EFFECTS	Tickling a particular effect will cause it to become activated. The following are supported :

	GUN FIRE EFFECT	Effect when forward facing cannons are fired.	
	EXPLOSION EFFECT	Effect from nearby explosion	
	HIT EFFECT	Effect when spacecraft hit by gunfire.	
	COLLISION EFFECT	Effect when the ship collides with another object.	

2.6 KEYBOARD MAPPINGS

The Keyboard Mapping Options window allows the operator to customise the functions of the game's control keys. Figure 2.6 illustrates the structure of the screen.



The top row of buttons allows the control key mappings for each of the game's screens to be selected. The central area allows a particular option to be reprogrammed by clicking on the relevant button and then hitting the desired new keyboard value.

2.7 MUSIC

The application has been designed to allow the user to import 3rd party music and to indicate at which point a desired theme should be played during the game. The following formats are supported:-

Midi Files These are files that contain a set of instructions for a computer or synthesizer to play. They do not contain actual sounds, but information on how to make the sounds instead. The files are typically compact and rarely exceed a few hundred kilobytes. The major drawback of this format is that their playback can vary depending on the device that is used to read them.

Ogg-Vorbis Files These are similar to MP3 but are open source and do not incur licensing fees. Whilst they produce high quality playback that sounds basically identical on different devices they are considerably larger than 'midi' files with a size of around 2-5 Mbytes. A further disadvantage is that when these files are loaded into RAM ready for playing they typically expand by a factor of 10 and thus machines that have limited quantities of such memory (i.e. 256M) should avoid using these files in the game. MP3 files can be readily converted into the Ogg-Vorbis format and an excellent free conversion tool can be found at NCH Swift Sound (www.nch.com.au/switch/index.html).

Music in the form of an 'ogg' file should be copied into the 'ogg' directory, whilst 'midi' files should be copied into the 'midi' directory as shown Figure 2.7.1. These files will then be automatically picked up when the application boots.

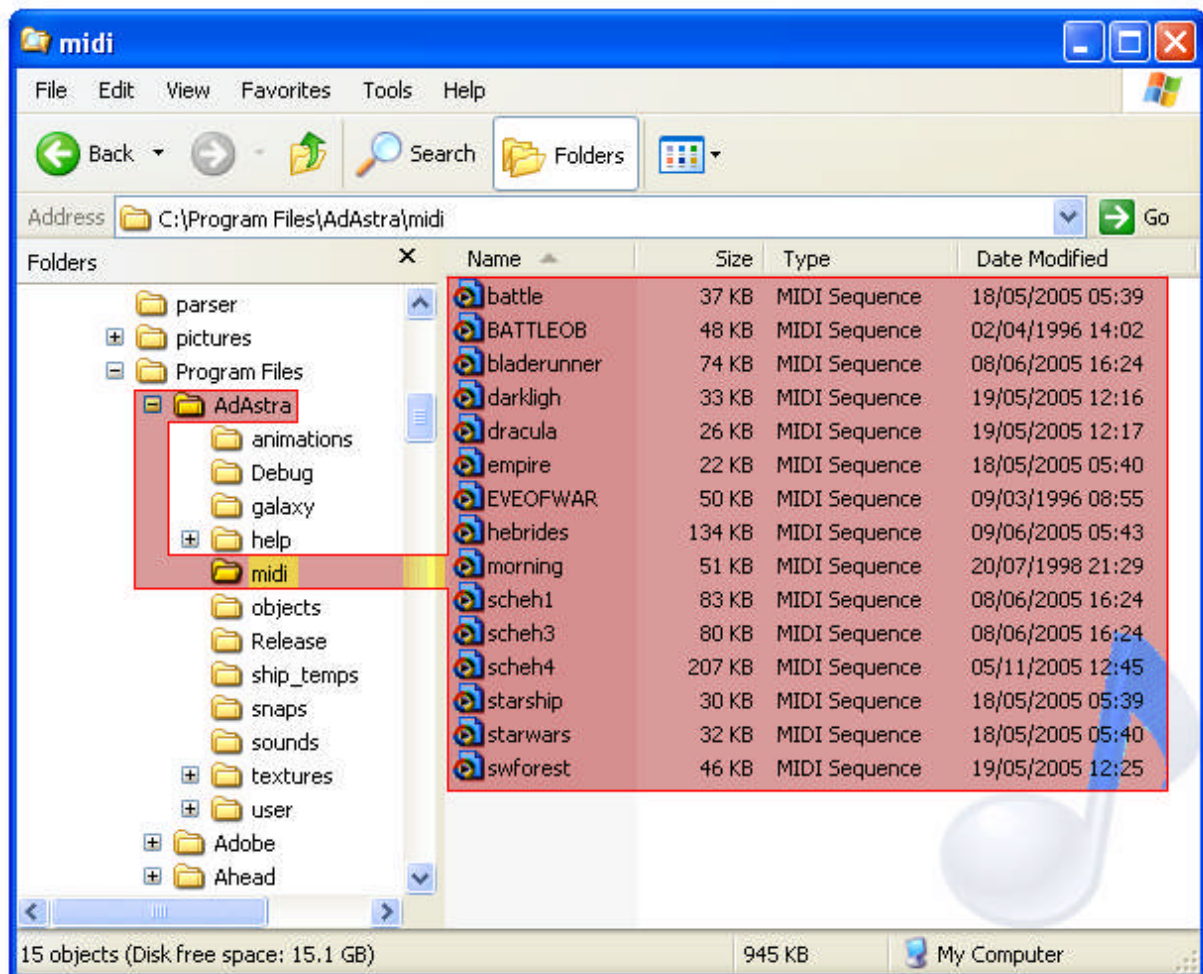


Figure 2.7.1

To configure the games music the user should enter the 'music options' screen found under the main options menu structure. Figure 2.7.2 illustrates the structure of the Music Options window.

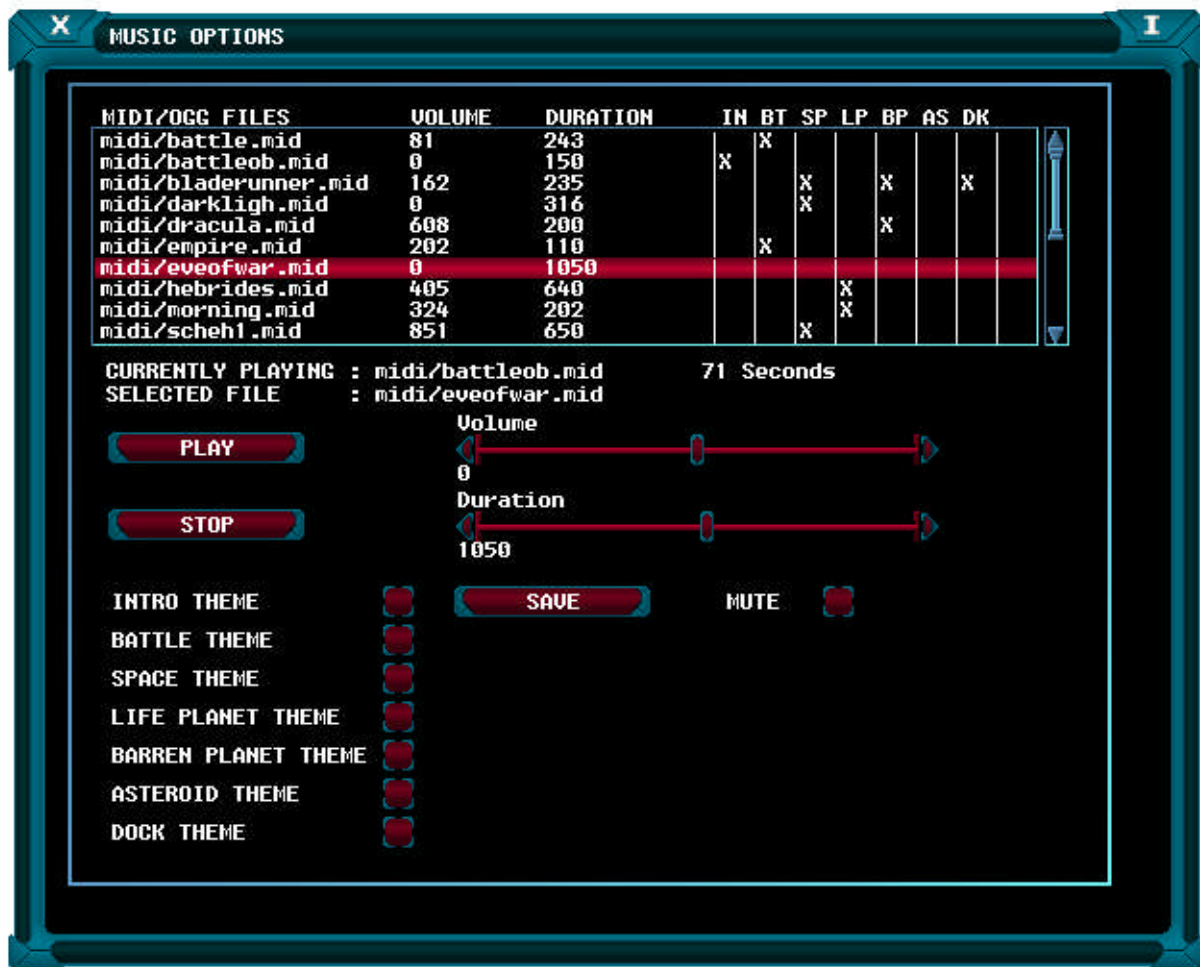


Figure 2.7.2

At the top of the window lies a scrolling list of all the midi/ogg files that the application has found within the 'midi'/'ogg' directories. The volume, duration and music's themes are also displayed. Below this list, the file that is currently playing is displayed together with an indication of how long it has been playing for.

By clicking on a file in the list area of the window the user can adjust its configuration. Table 2.7 describes the available options.

TABLE 2.7		
PLAY	Plays the currently selected music file.	
STOP	Stops playing the current music.	
VOLUME	Adjusts the volume of the currently selected file. If the selected file is playing then the effect will be immediately audible.	
DURATION	Adjusts the maximum duration (measured in seconds) of the selected music. It may be necessary to adjust this value for some pieces of music as there are instances where DirectX continues to play the file long after it has finished.	
MUTE	Suppresses music playback.	
SAVE	Saves the current settings.	
THEMES	Ticking a particular theme indicates a specific event when the music should be played. The following themes are supported :	
	INTRO THEME	IN The introduction theme music.
	BATTLE THEME	BT The music that is played when your ship comes under attack.
	SPACE THEME	SP The music that is played when you ship is simply flying through space.
	LIFE PLANET THEME	LP The music that is played when you ship is within the atmosphere of a life supporting planet.
	BARREN PLANET THEME	BP The music that is played when you ship is within the atmosphere of a barren planet.
	ASTEROID THEME	AS The music that is played when your ship is within an asteroid field.
	DOCK THEME	DK The music that is played when your ship is docked.

A piece of music can have more than one theme. For instance, in Figure 2.7.2, Bladerunner (file 3) can be played when flying through space, when within the atmosphere of a barren planet or when docked.

If more than one piece of music possesses the same theme then the music to be played will be selected at random.

Once the desired configuration has been saved it will be automatically adopted when the game executes.

2.8 SOUND EFFECTS

The sound effect window as shown in Figure 2.8 allows the volume of each sound effect to be adjusted.



Figure 2.8

2.9 DIAGNOSTICS

The diagnostics screen was used extensively during the application's development and has been retained as an aid to allow the user to fine tune it. Figure 2.9 illustrates the layout of the screen and the useful area is the table of functions below the memory readouts. The column on the left lists various functions within the game and the column on the far right displays the duration of the function in milliseconds.



Figure 2.9

The following table describes each of the key functions and what they mean

FUNCTION	MEANING
Total	Total time to execute 1 frame. The value of 31ms means that the game is running at about 32 frames per second.
Main	Main application loop. Basically the same as 'Total'
sc_draw_view	Control function which pushes primitives onto the graphics processing pipeline. The suite of functions that execute here will place loading onto both the CPU of the PC and the GPU of the Graphics card. If this function runs relatively slowly then it could be due to the processor, the graphics card or the interface between the two.
sc_draw_other	A set of routines used for drawing the windows and icons. If this function runs slowly then it's most likely due to the speed of the processor.
General CPU actions	Control function which moves all the objects within the game, calculates fractals, and produces sound effects.
rndd_start_dd	Routine used when re-synchronising the CPU and the GPU. If this has a value of greater than zero then the Graphics Card is running much slower than the processor.
ad_create_adverts	Routine used for creating animated adverts. It can be disabled via the preferences screen.

2.10 SPACECRAFT SKIN

Figure 2.10 illustrates the 'spacecraft skin' menu which can be used to personalise your current spacecraft.

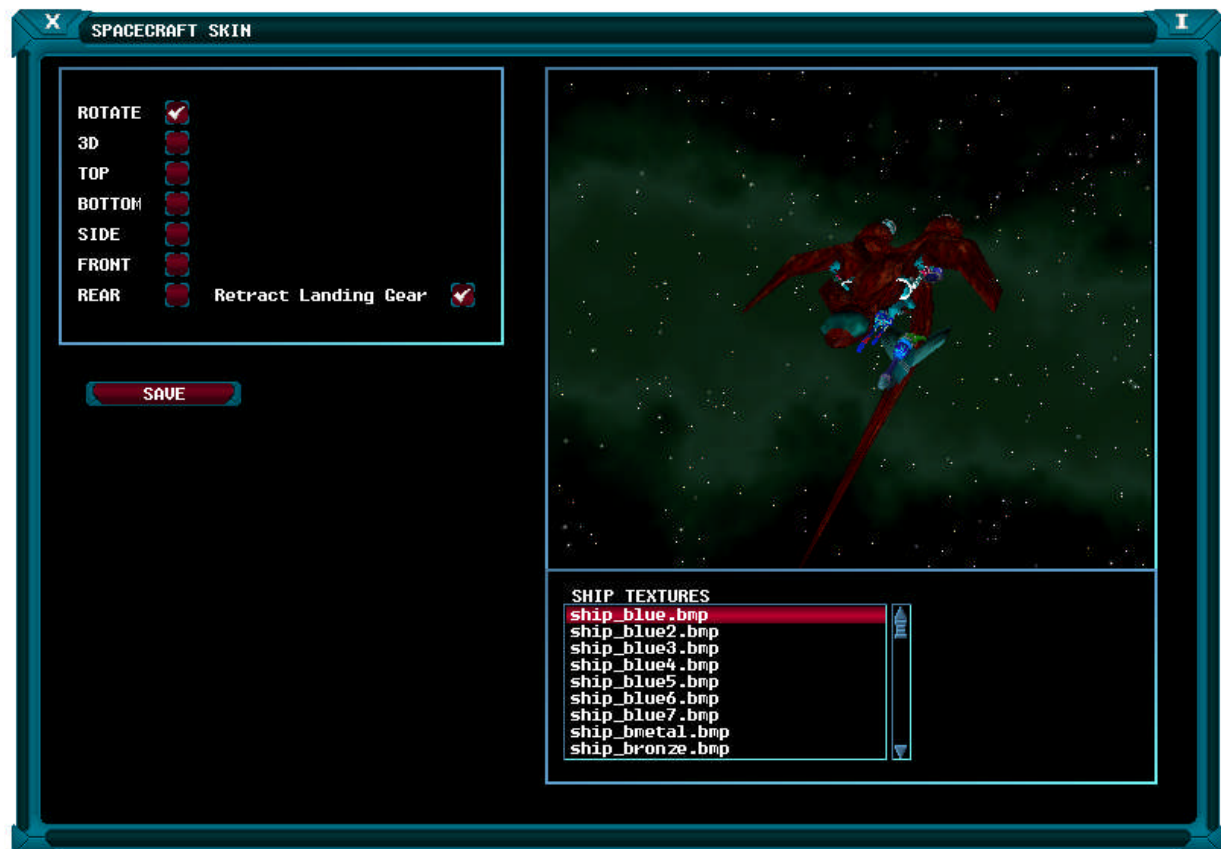


Figure 2.10

SECTION 3: FLIGHT CONTROLS

Your chosen Spacecraft can be controlled either manually or by the autopilot as detailed below:

3.1 AUTOPILOT

After a series of high speed disasters caused by pilot error the autopilot is now a mandatory fitting on all Spacecraft. The device is able to unleash the full power of the ships engines and should be used when vast distances need to be crossed within a Star System. A suitable target (refer to Section 4) should be selected first, which can be another Spacecraft, Space Station, Planet or City and the system engaged by pressing the 'A' key. The autopilot can be disengaged by pressing the 'A' key a second time.

The autopilot will adjust the velocity of the ship in accordance with its proximity to any planet and its distance from the designated target and whilst in this mode the pilot will have very little direct control over the vessel. However if the device is navigating between cities on the same planet then it may have calculated a low altitude trajectory to the destination which may curtail the speed of the ship. Under these circumstances the pilot is allowed to issue an instruction to gain extra altitude using the 'G' key which should allow a higher 'safe' velocity to be achieved.

3.2 MANUAL CONTROL

Under manual control the power of the engines is severely restricted and this mode is used for combat or final manoeuvring when in close proximity to a chosen destination. Either the mouse or the joystick can be used and full details can be found in the 'Input' section of this manual.

The speed of the ship can be increased using the '+' key and decreased using the '-' key. Whilst in space it is possible to fly backwards, however once within a planets atmosphere then the ships aerodynamics will prevent such a manoeuvre.

3.3 ATMOSPHERIC FLIGHT

In order to fly within a planets atmosphere then your craft must be aerodynamically viable. This means that it must possess wings and be of relatively light construction. Most fighters and smaller freighters are capable of sustaining flight whereas large freighters such as the Mammoth are not.

Pilots should also be aware that travel within a planets atmosphere is considerably more dangerous than in space due to the effects of gravity. If any of a vessels wings are destroyed or its engines damaged then it is likely to drop out of the sky with fatal consequences for the crew.

SECTION 4: SELECTING A TARGET

A Planet, City, Space Station or Spacecraft can all be selected as targets for your ship's autopilot or defence systems. In each case the details of the selected object will appear in the Target window described in Section 1.1 and a small blue arrow attached to the central sights will also point in its direction. The target objects can be assigned in a variety of different ways as described in the following subsections

4.1 SPACECRAFT

Spacecraft can be selected using the Long Range Scanners (refer to Section 1.1), by pressing the 'V' key (i.e. Vessel) or by disabling the mouse control (using shift or the right mouse button) and left clicking on the actual Ship in view. If Enhanced Short Range Scanners have been purchased then these can also be used to select hostile forces.

When a ship is selected then the target lock icon will be superimposed over its image. Referring to Figure 4.1 it can be seen to take the form of a large red octagon in the image on the left. This icon will rotate concentrically inwards until it forms a smaller yellow symbol as shown in the image on the right. The icon completing this transformation indicates that the targets position has been locked into the Ships computers and can be downloaded as telemetry into a missile's targeting system.



Figure 4.1

4.2 PLANETS AND CITIES

A planet can be selected either by repeatedly pressing the 'P' key or via the Star System Map as described in section 1.4. A city on the currently selected planet's surface can be targeted using the 'O' key or from the 'Selected Planetary Body' window of the Star System Map.

4.3 SPACE STATIONS

A Space Station orbiting a particular Planet can be chosen through the Star System Map or by pressing the 'S' key.

TARGET SELECTION SUMMARY	
S	Target Space Station
V	Target Vessel (i.e. Spacecraft)
P	Target Planet
O	Target City on Target Planet
L	Open/ Close Long Range Scanner Window
F1	Star System Map

SECTION 5: COMBAT

In all but the safest systems combat is unavoidable and in order to deal with hostile situations most ships possess shields, a selection of forward facing cannons, at least one missile launcher and sometimes a number of turrets. The following subsections describe how each of these systems should be used.

5.1 SHIELDS

Shields are polarising filters capable of blocking electromagnetic radiation and as such only provide protection against Lasers. All projectile based weaponry such Railguns, Plasma Cannons and Missiles are completely immune to their presence. Although the application of shields is highly specific their need should not be underestimated as in many respects a Laser is without peer as an offensive weapon.

A single shield unit supplies 10MW of power which is distributed across the surface area of the object to be protected. The larger the surface area displaced the more shield units will be required to provide 100% protection against Laser fire. As the shield absorbs electromagnetic energy its power will be progressively depleted and once it falls below a certain threshold then damage to the ship's metalwork will be sustained if hits are incurred.

The data sheets for a particular spacecraft design should be consulted in order to determine how many units will be required to provide 100% protection. However this should be viewed as a minimum value as it simply represents a threshold at which full immunity is reached and most vessels operate with an overbooking factor of several times this amount. It should also be borne in mind that a single shield unit recharges at a rate of 30KW/second and that this value is augmented as the number shield units is increased.

5.2 MISSILES

A typical spacecraft will possess a number of missile launchers each of which consists of a magazine that will dictate the order in which the contents are fired. The magazine of a launcher can be loaded when docked at either a Space Station or a Landing Pad and care should be taken when adding the missiles as their order cannot be changed once in flight. Referring to Figure 5.2 which illustrates the contents of a typical magazine it can be seen that the Dark Shadow will be fired first followed by another Dark Shadow then a pair of Grand Slams etc.

To fire a missile the number of the required missile launcher should be pressed (i.e. Keys '1' to '5'). Once launched the missile will home in on the selected target provided that its position has been downloaded into the missile's targeting computers as described in section 4.1.

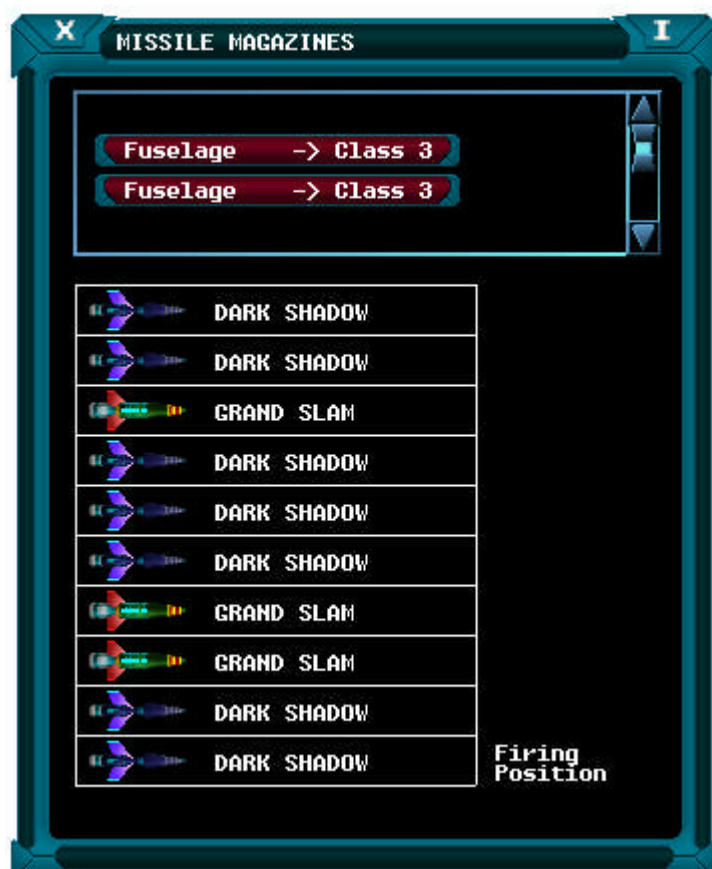


Figure 5.2

5.3 FORWARD FACING CANNONS

The forward facing cannons can be fired using the 'Left' Mouse button or the Joysticks trigger button. Unlike Missiles or turrets there are no special targeting requirements.

5.4 GUN TURRETS

Gun turrets provide a very effective means of defence and all large freighters will incorporate a number of these items. The Weapons Management window described in Section 1.1 describes how to configure them.

SECTION 6: OCCUPATIONS

The ownership of any spacecraft opens up many opportunities for those of an enterprising nature to make for themselves a rather large fortune. However the form of spacecraft that is flown will effectively constrain the types of career opportunities that are realistically available. Although a small fighter can earn a living through trade the income is relatively meagre and its nimble fight characteristics make it ideal in any form of employment that involves combat. In a similar vein the unwieldy nature of a Super Freighter makes it less than ideal as an aggressive battleship.

The following table lists the ideal forms of employment for each of the three major spacecraft formats.

SMALL FIGHTER	ATMOSPHERIC FREIGHTER	SUPER FREIGHTER
Bounty Hunter	Bounty Hunter	Trader
Alien Fighter	Alien Fighter	Asteroid Miner
Salvager	Salvager	
Scavenger	Asteroid Miner	
Pirate	Trader	
	Scavenger	
	Pirate	

6.1 TRADE

Commodities, weapons and equipment can all be traded at either the Space Stations or City Star Ports located within a particular solar system. Whilst it is possible to take advantage of the price differential between Stock Exchanges located within the same system this is rarely particularly profitable and typically only the local government performs this duty as a means of oiling the wheels of commerce. For the freelance entrepreneur inter stellar trade is the only viable means of turning a decent profit and if a large freighter is used then enormous sums of money can be made in a relatively short space of time.

6.2 SALVAGE

All spacecraft are fitted with tractor beams which can be used to pick up ship wrecks and sell them for salvage at a nearby Space Station. Figure 6.2 illustrates a typical salvage operation being performed high above the atmosphere of a nearby planet. As can be seen in the left-hand image the ship approaches the wreck so that it has a trajectory slightly above it. Once over the target the tractor beam is activated using the '[' key which if successful will cause a series of electromagnetic pulses to envelop the object.



Figure 6.2

Once the ship has been secured it can be flown to the nearest Space Station and deposited using the ']' key. Provided that the released wreckage drifts within docking range it will be picked up and the Space Station will be obliged to pay a fair price for the spacecraft and its contents. An itemised 'Salvage Statement' will be issued when the transaction has been completed.

The following points with respect to the use of tractor beams should be observed.

1. The wreckage should not be much larger than the operators own ship. If the target is too large then it may be possible to 'prune' it by destroying non critical components such as the wings.
2. Salvage operations within a planets gravitational influence are extremely hazardous to perform and under manual control the operator's ship will be unable to sustain flight. Under such circumstances either the autopilot should be engaged as soon as possible or the salvage should be released.

3. Once a wreck has been secured by a tractor beam contact with all objects should be avoided otherwise the salvage may break free.

6.3 DEBRIS SCAVENGING

The destruction of any spacecraft will cause its cargo bay to disgorge a significant amount of debris which can be harvested relatively easily by any enterprising pilot. By fitting a Debris Collector and the optional Debris Analyser, cargo canisters can be retrieved by flying just above them as illustrated in Figure 6.3.



Figure 6.3

6.5 BOUNTY HUNTING

The destruction or apprehension of criminals is actively encouraged by the Inter Stellar Police force and generous rewards are available for any pilot willing to take on a law enforcement role. In addition to a standard bounty extra incentives are often posted by the police for the bringing into custody of the most violent individuals. The particularly successful pursuers of this career path tend to bring their prey to justice alive rather than dead as the salvage rights of the criminal's spacecraft often proves more lucrative than the bounty itself.

6.6 ALIEN FIGHTING

The Alien Fighter takes on a role that is very similar to that of the Bounty Hunter, except that it is typically far more dangerous. The fight against the Alien Menace is centred at the edge of charted space in the lawless systems around Algorab. In addition to a very hostile environment the typical Alien vessel is superior in both speed and firepower to the equivalent human one and hence only the most experienced individuals pursue this career. However generous bounties paid by the Royal Navy and the enhanced value of any salvaged spacecraft make Alien Fighting a quick, but often deadly route to vast amounts of wealth.

6.7 PIRACY

Whilst salvaging the wreckage of criminals or aliens can be very lucrative, their cargo holds are often empty. Hence the quickest method of attaining unimaginable wealth is to disable any trade ships that usually carry vast quantities of freight. The salvage rights on such vessels can be enormous, however the judiciary take a very dim view of such actions by imposing punitive fines and the Interstellar Police Force will pursue such individuals without mercy.

6.8 ASTEROID MINING

Breaking rocks in the asteroid belts of the many gas giants that occupy a typical Solar System can be a quick and easy way of generating cash for the owners of larger spacecraft. Although the equipment necessary to mine ore can be fitted to smaller ships, their limited cargo capacity can make this form of occupation a frustrating one due to the constant need to ferry ore back to the nearest stock market. Although only a Debris Collector and a decent compliment of weapons is required to undertake this form of occupation an asteroid analyser is highly recommended as it will help locate the most valuable sources of minerals.

Figure 6.8 shows a typical mining operation where the spacecraft has positioned itself relatively close to the required asteroid. The weapons fire causes debris to be ejected from the surface of the target which is automatically scooped up by the debris collector.



Figure 6.8

SECTION 7: DOCKING

In order to conduct any business activities you will need to dock with a Space Station or land at a City. As you approach the destination pressing the 'D' will send a request to Space Traffic Control. If in range then they will take control of your Spacecraft and perform the necessary docking or landing manoeuvres. Once docked or landed then access to the ports facilities will be granted via a menu bar as shown in Figure 7.



Figure 7

Goods that can be bought or sold can be accessed via the 'Stock' button whereas services can be accessed via the 'Facilities' button. The 'Contacts' button allows access to the Police and Royal Navy Bulletin boards. When buying goods you will be allowed to exceed your Cargo Capacity whilst docked, however you will not be allowed to leave the Space Port in this state. The following subsections describe each of the available options in more detail.

7.1 STOCK EXCHANGE

A typical Stock Exchange window is shown in Figure 7.1. Your Cash reserves and free hold capacity are displayed at the top of the screen and below it appears a list of the available Stock.

The number in the centre of the 'Red Rectangle' indicates the quantity of stock that is currently within your ships Cargo bay. Clicking the arrows to the left allows this stock to be sold whereas those on the right will issue an instruction to purchase more. The inner arrows will buy/sell one item, the centre arrows will buy/sell ten items and the outer ones will buy/sell one hundred items. The cost and the quantity of the stock held at the Space Port are tabulated on the right-hand side.

STOCK EXCHANGE					
CASH 10000		FREE HOLD CAPACITY 9			
Stock Item	Sell	HOLD	Buy	Price	Quantity
Deuterium	◀◀◀	0	▶▶▶	£56	29
Ferrous Metals	◀◀◀	0	▶▶▶	£55	3793
Strategic Metals	◀◀◀	0	▶▶▶	£129	112
Precious Metals	◀◀◀	0	▶▶▶	£297	694
Gemstones	◀◀◀	0	▶▶▶	£253	268
Inorganic Chemicals	◀◀◀	0	▶▶▶	£79	1578
Hydrocarbons	◀◀◀	0	▶▶▶	£93	157
Food	◀◀◀	0	▶▶▶	£28	0
Polymers	◀◀◀	0	▶▶▶	£120	490
Ceramics	◀◀◀	0	▶▶▶	£120	921
Textiles	◀◀◀	0	▶▶▶	£44	934
Building Materials	◀◀◀	0	▶▶▶	£31	2309
Industrial Materials	◀◀◀	0	▶▶▶	£49	1603
Consumer Goods	◀◀◀	0	▶▶▶	£112	2923
Pharmaceuticals	◀◀◀	0	▶▶▶	£224	483
Electronic Parts	◀◀◀	0	▶▶▶	£215	359
Machine Tools	◀◀◀	0	▶▶▶	£264	1073
Communication Equipment	◀◀◀	0	▶▶▶	£253	2124

Figure 7.1

Table 7 gives a brief synopsis describing the properties of each of the commodities.

TABLE 7 : STOCK DESCRIPTION	
DEUTERIUM	Heavy Water is required in large quantities by all Fusion Reactors and is used to power practically everything. Main Source of Production: Oceanic Planets.
FERROUS METALS	Iron and Steel are used in all forms of heavy industry where weight is not a primary concern. Most Space Stations and Heavy Freighters are manufactured using vast quantities of exotic Steel alloys. Main Source of Production: Asteroid Belts and Barren Planets.
STRATEGIC METALS	Metals of military importance such as Titanium. Such materials are often used where weight is at a premium and most Space Craft capable of atmospheric flight will be made extensively of such commodities. Main Source of Production: Asteroid Belts and Barren Planets.
PRECIOUS METALS	Metals of economic value such Gold or Silver. Such metals are generally resistant to corrosion and are widely used in the manufacture of consumer goods and electronic components. Main Source of Production: Asteroid Belts and Barren Planets.
GEMSTONES	Whilst used extensively in the manufacture of consumer goods, the production of Crystalline Lasers places the heaviest burden on the Gemstone market. Main Source of Production: Asteroid Belts and Barren Planets.
INORGANIC CHEMICALS	Inorganic chemicals cover a wide range of commodities such non metallic elements, acids and alkalis. They are widely deployed throughout the manufacturing spectrum. Main Source of Production: Asteroid Belts and Barren Planets.
HYDROCARBONS	Hydrocarbons are used extensively by all forms of industry. Main Source of Production : Life Supporting Planets
FOOD	Main Source of Production : Life Supporting Planets
POLYMERS	Polymers are manufactured on planets where there is a good supply of Hydrocarbons and inorganic chemicals
CERAMICS	The manufacture of ceramics requires a ready supply of inorganic chemicals.
TEXTILES	Textiles require supplies of Polymers and Inorganic chemicals.
BUILDING MATERIALS	Building materials require a supply of Ferrous Metals and Inorganic chemicals.
INDUSTRIAL MATERIALS	Industrial materials require supplies of Metals, Polymers and Inorganic Chemicals.
CONSUMER GOODS	Consumer goods require supplies of Gemstones, Metals and Polymers.
PHARMACEUTICALS	Pharmaceuticals require Polymers, Inorganic Chemicals and Hydrocarbons.
ELECTRONIC PARTS	Electronic Parts require Metals, Polymers and Inorganic Chemicals.
MACHINE TOOLS	Machine Tools require Metals, Ceramics and Electronic Parts.
COMMUNICATION EQP	Communication Equipment requires a supply of Metals, Ceramics and Electronic Parts.

7.2 ORDNANCE

Ordnance can be purchased in a similar manner to Commercial Stock and Figure 7.2 shows an example window. The Missiles are listed on the left of the screen and 'clicking' the red areas will cause its details, together with the price and the quantity available to be displayed on the right-hand side. The 'Arrow Buttons' allow the item to be bought or sold and the central box indicates the quantity that is currently held in the Cargo Bay.

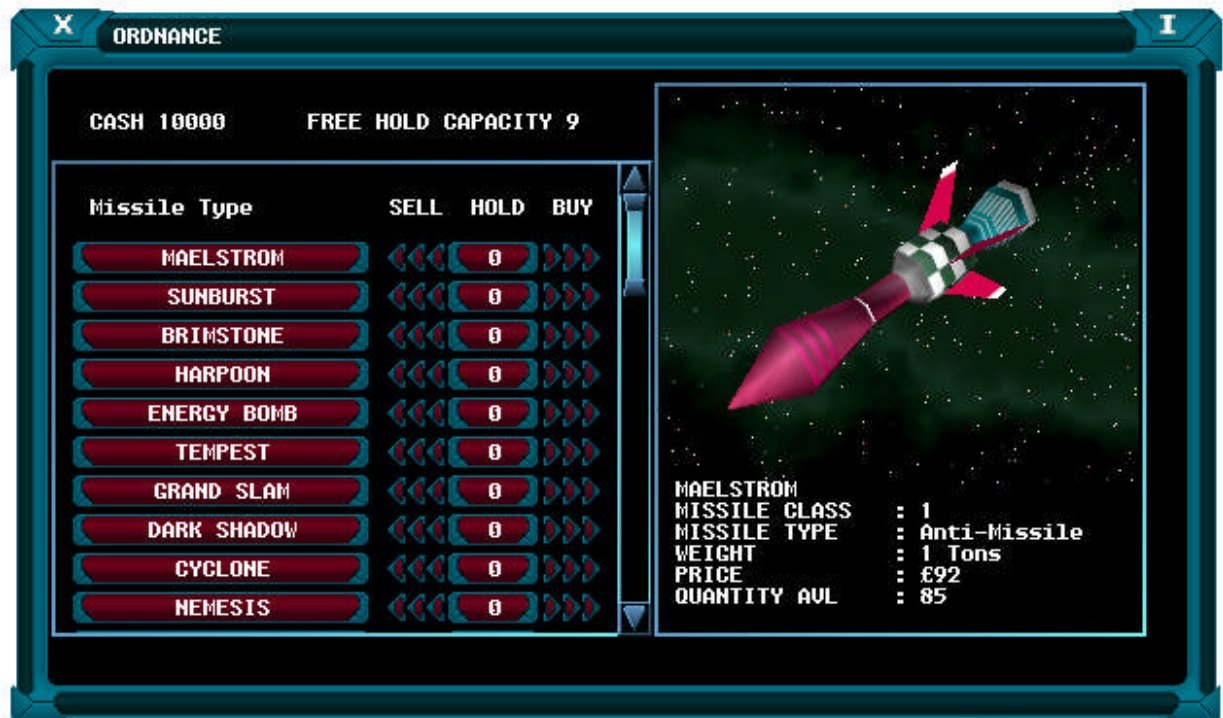


Figure 7.2

7.3 CANNONS

Cannons in the form of Lasers, Railguns or Plasma Weapons use a screen that has an identical format to that of the Ordnance Window. Refer to Figures 7.3a and 7.3b for examples of these screens.

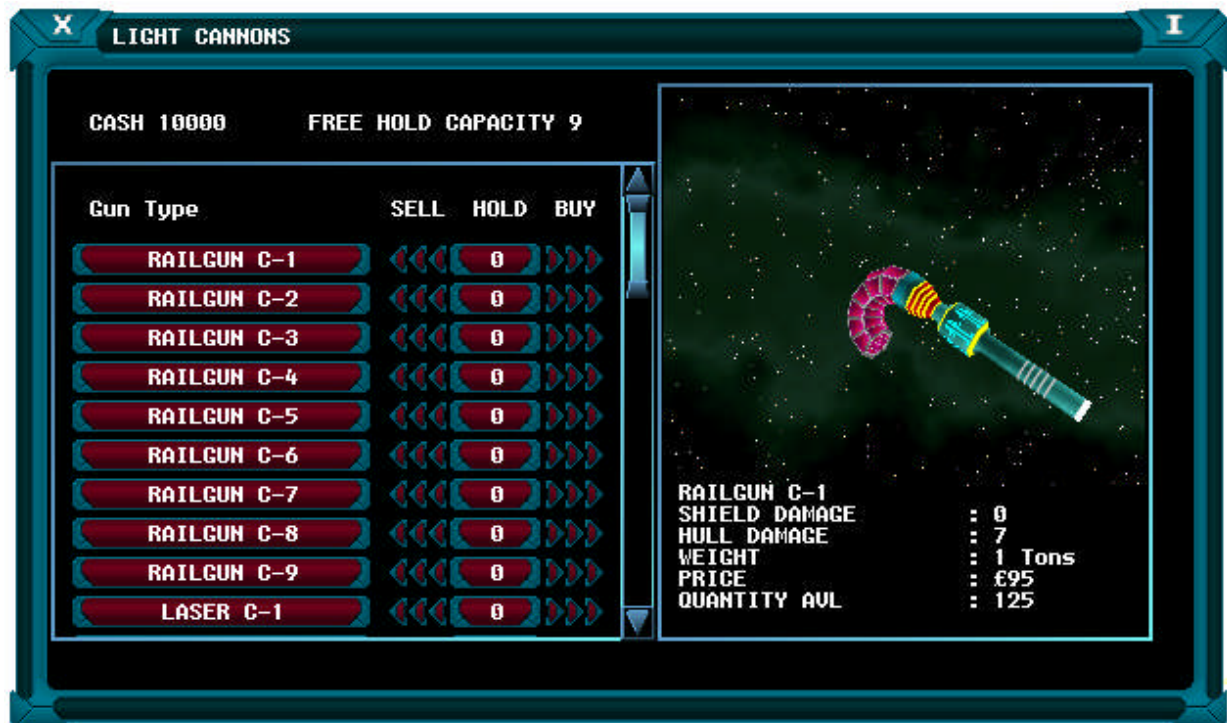


Figure 7.3a

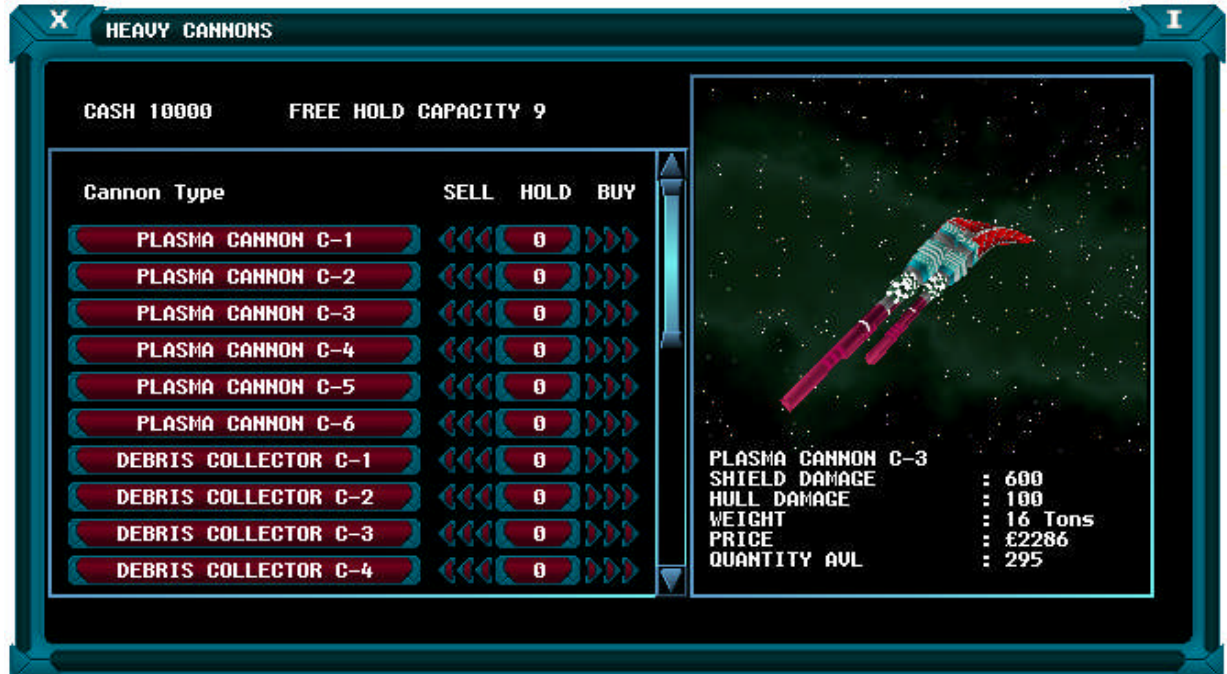


Figure 7.3b

7.4 SHIPYARD

The Shipyard allows you to trade in your existing Ship and upgrade to a superior model. Referring to Figure 7.4, the available ships are listed in the top left-hand area and clicking the appropriate button will cause the desired Ship to appear to the right. The displayed ship can be manipulated using the controls in the bottom left and a report of the trade-in details and the 'buy' option lies to the right.

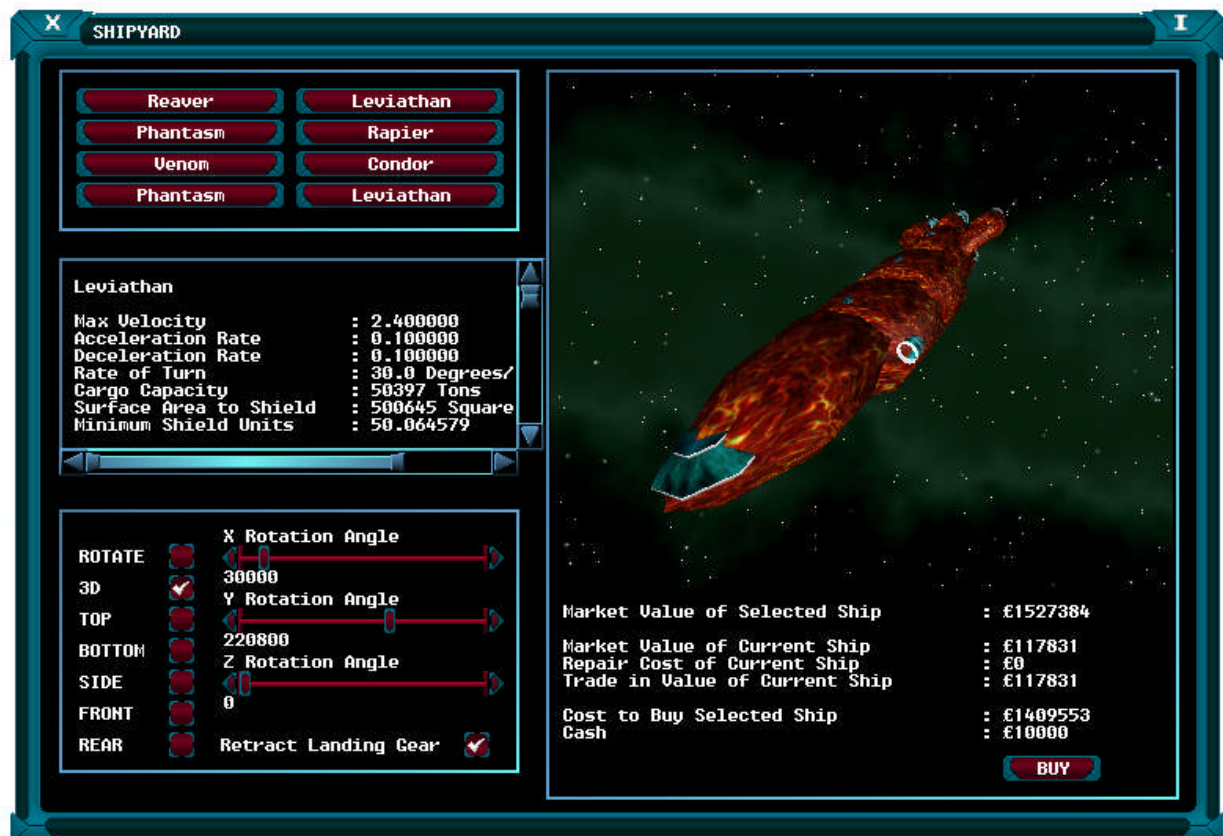


Figure 7.4

7.5 WORKSHOP

The Workshop is where you can get your spacecraft repaired and a typical screen is shown in Figure 7.5. The left-hand area lists your ship's components together with a 'Damage' bar and a cost to fix. For each component there is a box that can be ticked which indicates whether the component should be repaired. The area on the right displays the ship and also reports how much it will cost to fix all or just the selected components. The lower buttons instruct the mechanics to repair the desired items.

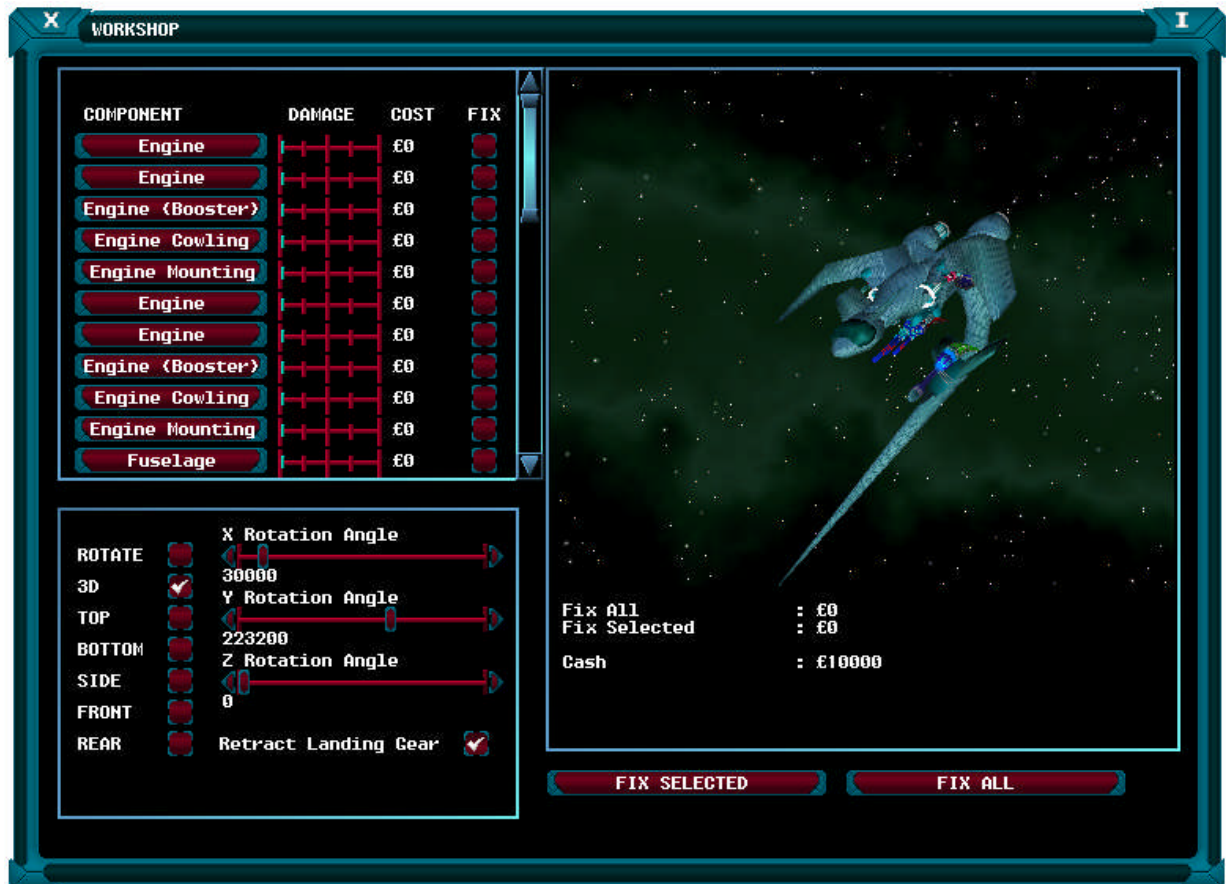


Figure 7.5

Major components should be fixed first as smaller units which depend on a destroyed parent item cannot be repaired if there is nothing for it to be mounted onto. For instance an engine cowling should be repaired before its constituent engines.

7.6 WEAPON FITTERS' SHOP

Figure 7.6 shows the Weapon fitters' shop which allows the Cannons to be focused and armaments to be fitted or removed. The area on the left displays the current 'Weapon Focus Range' and also each of the weapon mounting points. Selecting a weapon mount will cause it to be displayed on the right-hand side of the screen and allow the existing weapon to be removed or a new weapon to be added. When a weapon is removed it will be transferred into the Ships hold. When a weapon is to be fitted then a list of the suitable items that are currently held in the cargo bay will be listed. Selecting one of these will allow the gun to be fitted.

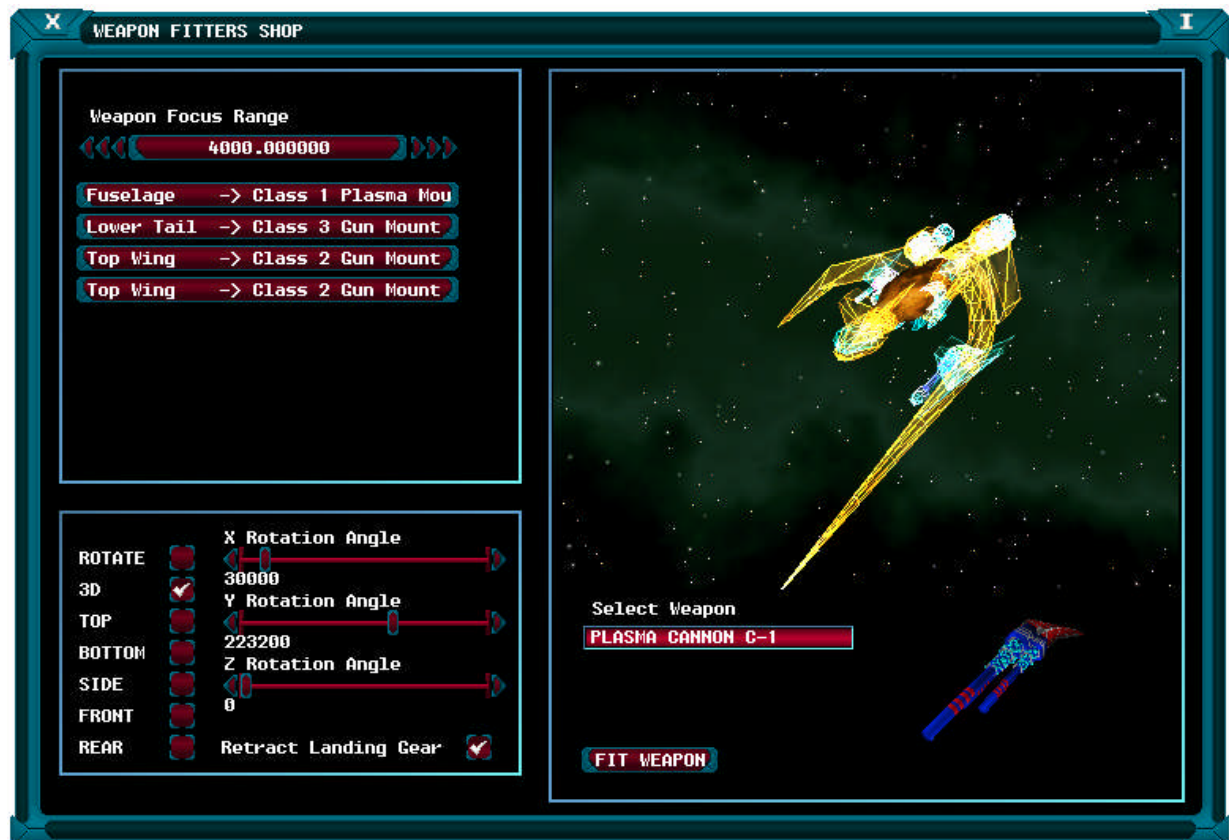


Figure 7.6

Adjusting the Weapon focus range allows the user to adjust the distance at which the Laser beams or Rail/ Plasma Cannon projectiles converge. On smaller ships the convergence range is not that important and should be set at a high value. However, as illustrated in Figure 7.6.1, it is more important on large ships where light fighters are able to fly between cannon fire. These ships should focus their weapons so that their fire converges at a much closer distance.

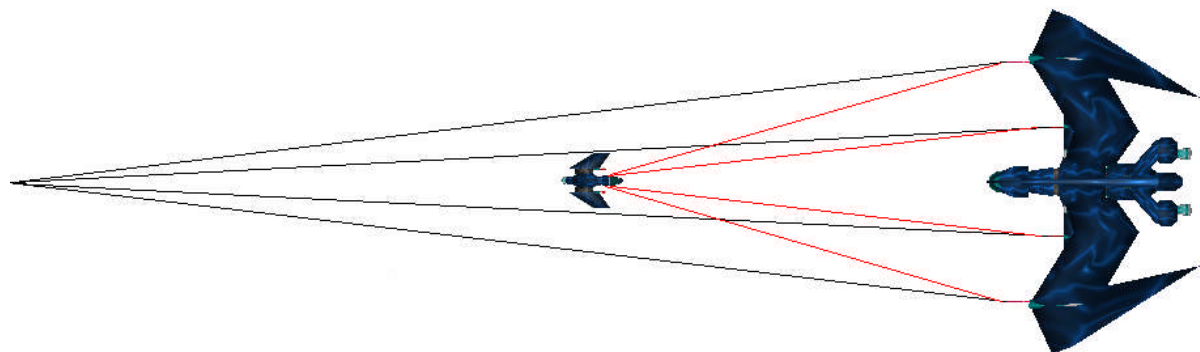


Figure 7.6.1

7.7 MISSILE LOADERS' SHOP

When a missile has been bought it is transferred into the cargo bay. In order to allow the missile to be fired then it must be loaded into one of the Spacecrafts magazines by entering the Missile Loaders' Shop. Figure 7.7 shows a typical screen where the area on the left displays a list of the Ships Magazines, which once selected will be displayed on the right. The magazine is displayed as a series of boxes where the firing position is located at the bottom. A list of the missiles that are held in the Cargo Bay which are compatible with the selected magazine are displayed below this together with a pair of buttons which allows the ordnance to be added or removed.

It should be noted that Missiles cannot be transferred between the hold and a magazine once in flight and that this operation can only be performed whilst docked.

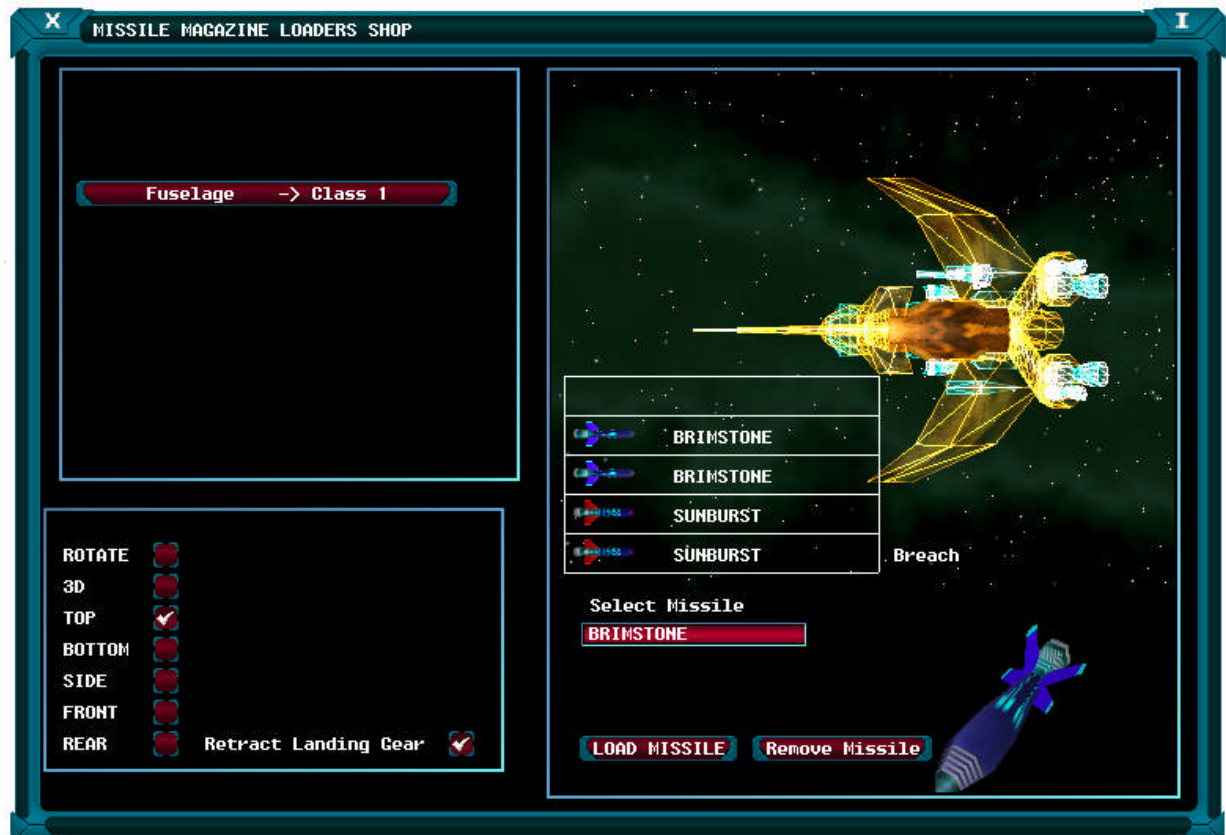


Figure7.7

SECTION 8: CRIME

It's a sad indictment of modern times that the rule of law is precarious throughout much of charted space. Undoubtedly this is fuelled by a perception that crime pays, and for many a recidivist it pays very well indeed. However, although life on the wrong side of the law may be lucrative it is by no means easy and the lifespan of a typical miscreant is seldom a long one. Punitive fines, aggressive policing and the encouragement of bounty hunters through generous rewards help keep delinquency under a certain degree of control.

The table below lists the most common crimes and their respective fines. Each individual misdemeanour will incur a fine, thus four charges of Criminal Damage will result in a penalty of £800. Crimes such as Assault and Criminal Damage incur relatively low fines as the authorities, whilst not wishing to condone such actions, recognise that these are violent times and that accidents do happen.

CRIME	DESCRIPTION	FINE
CRIMINAL DAMAGE	Low Level damage to a 3 rd party's Spacecraft	£200
COMMON ASSAULT	Significant damage to a 3 rd party's Spacecraft	£500
ASSAULTING A POLICE OFFICER	Significant damage to a Police Officer's Spacecraft	£1,000
PIRACY	Disabling a 3 rd party's Spacecraft through the delivery of a significant amount of damage.	£1,000,000
MURDER	Destruction of a 3 rd party's Spacecraft by delivering a significant amount of damage.	£2,000,000
POLICE MURDER	Destruction of a Police Officer's Spacecraft by delivering a significant amount of damage.	£5,000,000

As crimes are committed then these will be added to the offender's criminal record, which can be wiped clean by paying the outstanding balance at the local Space Port.

Whilst a petty felon, or violent criminal will be largely ignored by the law enforcement agencies, once they have transgressed into becoming an outlaw then all civil rights are forfeit. Whilst such malefactors may still not attract the attention of the police, the same is not the case of bounty hunters who are free to disable their ship, seize any cargo and collect any reward. Any criminal charged with piracy or murder will feel the full force of the law and will be pursued relentlessly until they are either dead or any fines have been settled.

SECTION 9: ORGANISATIONS

9.1 ROYAL NAVY

It wasn't long after the first colonies in Alpha Centauri were established that the Royal Navy began to procure a Space Fleet. Initially responsible for the security of the trading routes between Earth and the New Worlds its primary role was soon extended to cover deep space exploration and the claiming of territory for the crown. In recent years the emergence of an aggressive and mysterious alien force in the border systems surrounding Algorab has meant that its law enforcement role has been completely devolved to the Inter Stella Police Force allowing it to focus on the alien threat.

The wholesale deployment of the Vega, Altair, Fomalhaut and Archird, fleets to the border has meant that its presence has been spread increasingly thinly and the armed service has found it necessary to issue privateering licenses in order to bolster its stretched resources.

A career attached to the Royal Navy is extremely hazardous as it typically involves working at the edge of charted space and few spacecraft will complete an assignment unscathed. An informal ranking system operates for privateers, which allows the most lucrative (and dangerous) contracts to be awarded to the most skilful and reliable pilots. Those with no rank will initially only be allowed simple delivery missions but once a degree of trust has been established the available employment will become more varied as the individual rises through the institutions hierarchy.

The following Royal Navy ranks can be attained through the successful completion of contracts:

1. Able Spaceman
2. Midshipman
3. Sub Lieutenant
4. Lieutenant
5. Sub Commander
6. Commander
7. Captain
8. Commodore
9. Admiral

9.2 INTER STELLA POLICE FORCE

During the early years of galactic exploration law enforcement was the primary responsibility of the Royal Navy. However as the Navy was increasingly assigned the task of charting unexplored systems the inevitable increase in crime began to exert an increasingly severe economic toll on many settlements. Initial rudimentary police forces commissioned by individual colonies proved ineffective as felons could simply jump into neighbouring systems where their criminal record was clean. In response to this failure, the wealthiest colonies and by implication those with the most to lose, pooled their resources and created the Inter Stella Police Force. Although initially responsible for maintaining law and order within the core systems its mandate was rapidly extended until it covered all of charted space.

With the recent departure of the Royal Navy to the border the service has been exposed as considerably under resourced and has been forced to rely increasingly heavily on the subcontracting work to private individuals. A system modeled on the privateering structure employed by the Royal Navy has been adopted where contracts of increasing importance are issued as the individual proves their reliability.

The following ranks in the Inter Stella Police Force can be attained through the successful completion of contracts:

1. Constable
2. Sergeant
3. Inspector
4. Chief Inspector
5. Superintendent
6. Chief Superintendent
7. Commander
8. Commissioner

SECTION 10: WEAPONS

All spacecraft are able to deploy a wide variety of weaponry via a set of mounting points. Each mounting point has a classification which dictates the size of the weapon that can be supported and consequently any munitions that exceed the mount's designation cannot be fitted.

Most vessels also support a number of Missile launchers which also use a class system to indicate the type of ordnance that they can fire. In addition to their main purpose, a missile launcher is also capable of attaching a Heavy Cannon of matching or inferior classification.

The following subsections describe in more detail that type of weaponry that can be purchased at various trading posts.

10.1 ORDNANCE

Ordnance can be a cheap way of delivering a decisive blow to a designated target and four basic types are available as described in the following table.

ORDNANCE TYPE	DESCRIPTION
DESTRUCTIVE	Missile that delivers a high explosive payload to the designated target.
EM SHOCKWAVE	Missile used to damage shields by delivering a pulse of Electromagnetic Radiation. The damage that they record is measured in terms of the number of Shield Units that are depleted.
ANTI-MISSILE	Fragmentation device which shatters into a number of small high velocity bomblets which target any missiles not fired by the parent vessel.
DEFENSIVE-CLUSTER	Cluster missile which splinters into a number of smaller projectiles each of which will target any aggressor vessel. If no Aggressor is found then the parent vessel's current target will be loaded into the rocket's telemetry instead.

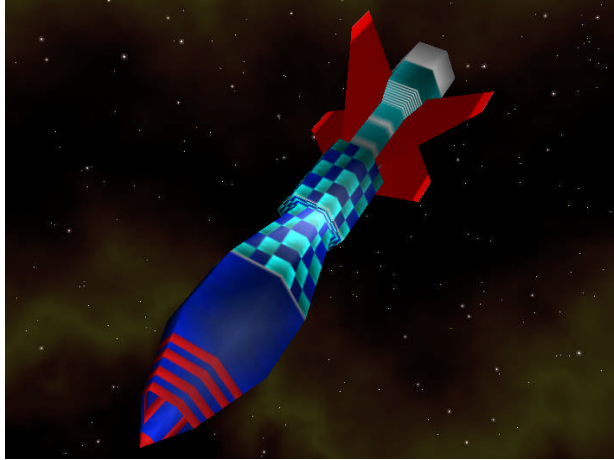
Like most weapons, missiles have various classes which describe the device's size and power. To launch a missile of the desired class, then a superior or matching launcher must be present on the parent spacecraft. For instance, a Class 3 missile can be loaded into a Class 4 magazine, whereas a Class 5 ballistic cannot.

10.1.1 MAELSTROM



MAELSTROM STATISTICS	
CLASS	1
TYPE	ANTI MISSILE
BOMBLETS	4
VELOCITY	12
WEIGHT	1 Ton
LENGTH	5 Feet

10.1.2 SUNBURST



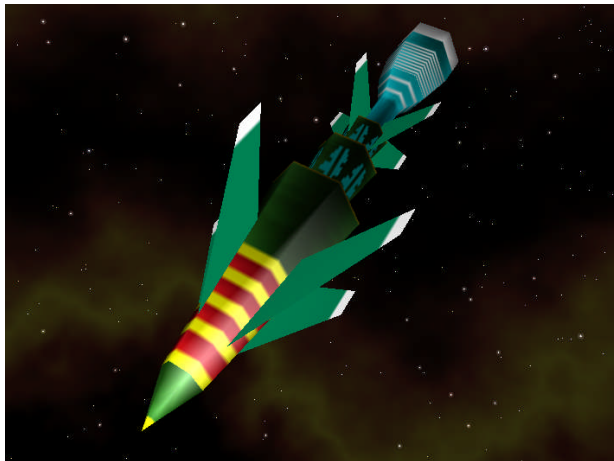
SUNBURST STATISTICS	
CLASS	1
TYPE	EM SHOCKWAVE
DAMAGE	5 Shield Units
VELOCITY	12
WEIGHT	1 Ton
LENGTH	5 Feet

10.1.3 BRIMSTONE



BRIMSTONE STATISTICS	
CLASS	1
TYPE	DESTRUCTIVE
DAMAGE	500
VELOCITY	12
WEIGHT	1 Ton
LENGTH	5 Feet

10.1.4 HARPOON



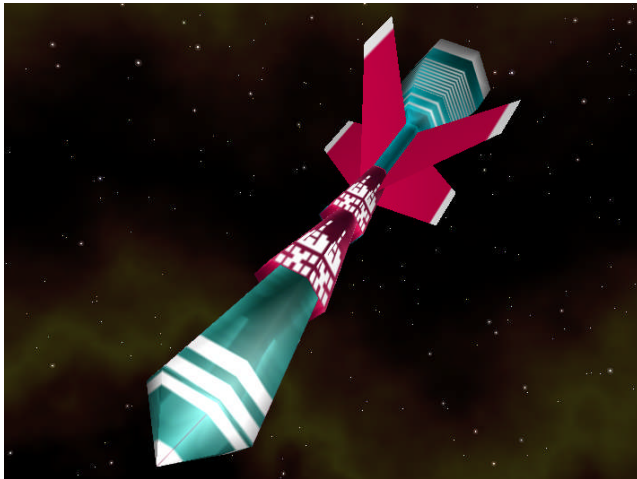
HARPOON STATISTICS	
CLASS	2
TYPE	DESTRUCTIVE
DAMAGE	1200
VELOCITY	12
WEIGHT	2 Tons
LENGTH	7 Feet

10.1.5 ENERGY BOMB



ENERGY BOMB STATISTICS	
CLASS	2
TYPE	EM SHOCKWAVE
DAMAGE	10 Shield Units
VELOCITY	12
WEIGHT	2 Tons
LENGTH	7 Feet

10.1.6 TEMPEST



TEMPEST STATISTICS	
CLASS	2
TYPE	ANTI MISSILE
BOMBLETS	6
VELOCITY	12
WEIGHT	2 Tons
LENGTH	10 Feet

10.1.7 GRANDSLAM



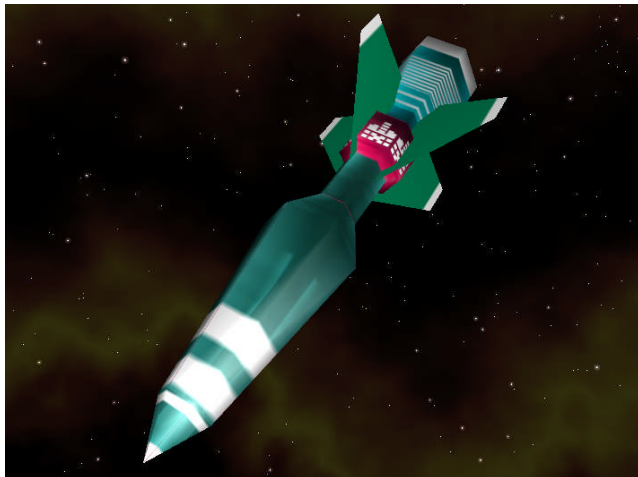
GRANDSLAM STATISTICS	
CLASS	3
TYPE	DESTRUCTIVE
DAMAGE	2000
VELOCITY	12
WEIGHT	3 Tons
LENGTH	10 Feet

10.1.8 DARK SHADOW



DARK SHADOW STATISTICS	
CLASS	3
TYPE	EM SHOCKWAVE
DAMAGE	24 Shield Units
VELOCITY	12
WEIGHT	3 Tons
LENGTH	10 Feet

10.1.9 CYCLONE



CYCLONE STATISTICS	
CLASS	3
TYPE	ANTI MISSILE
BOMBLETS	8
VELOCITY	12
WEIGHT	3 Tons
LENGTH	10 Feet

10.1.10 NEMESIS



NEMESIS STATISTICS	
CLASS	4
TYPE	DESTRUCTIVE
DAMAGE	3000
VELOCITY	12
WEIGHT	5 Tons
LENGTH	12 Feet

10.1.11 MIDNIGHT



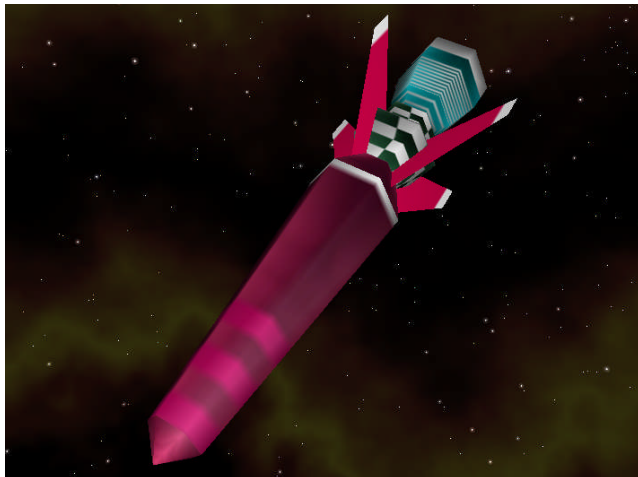
MIDNIGHT STATISTICS	
CLASS	4
TYPE	EM SHOCKWAVE
DAMAGE	32 Shield Units
VELOCITY	12
WEIGHT	5 Tons
LENGTH	12 Feet

10.1.12 WRATH



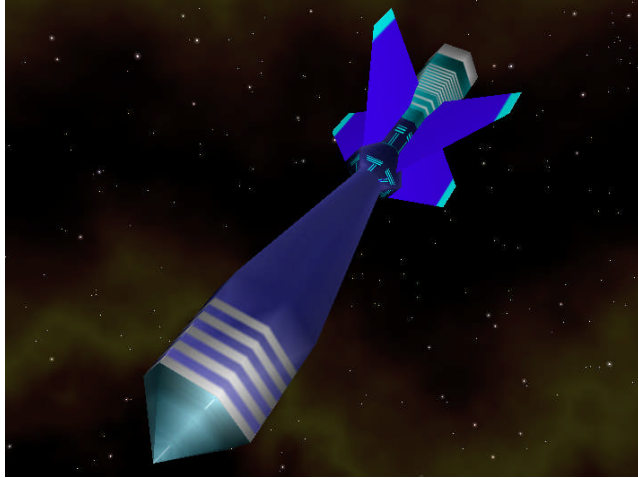
WRATH STATISTICS	
CLASS	4
TYPE	CLUSTER
SUBMISSILES	4 x BRIMSTONE
VELOCITY	12
WEIGHT	5 Tons
LENGTH	12 Feet

10.1.13 CATACLYSM



CATACLYSM STATISTICS	
CLASS	5
TYPE	DESTRUCTIVE
DAMAGE	4000
VELOCITY	10
WEIGHT	6 Tons
LENGTH	15 Feet

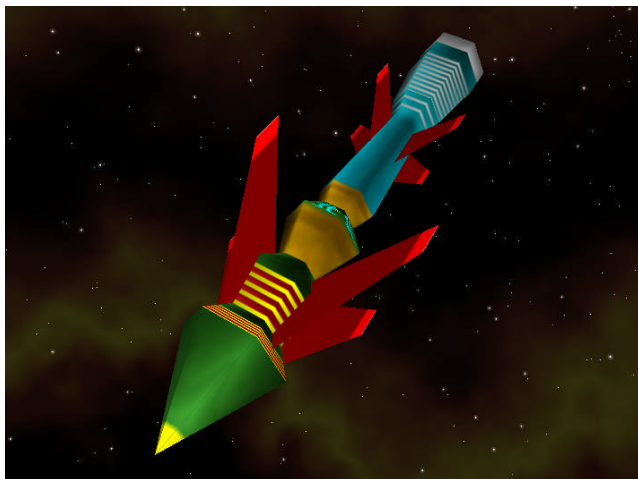
10.1.14 ENERGY LASH



ENERGY LASH STATISTICS

CLASS	5
TYPE	EM SHOCKWAVE
DAMAGE	48 Shield Units
VELOCITY	10
WEIGHT	6 Tons
LENGTH	15 Feet

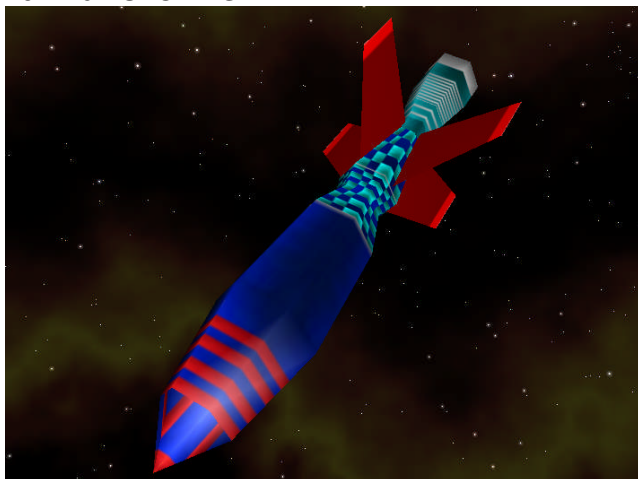
10.1.15 RAGE



RAGE STATISTICS

CLASS	5
TYPE	CLUSTER
SUBMISSILES	3 x BRIMSTONE 3 x HARPOON
VELOCITY	10
WEIGHT	10 Tons
LENGTH	15 Feet

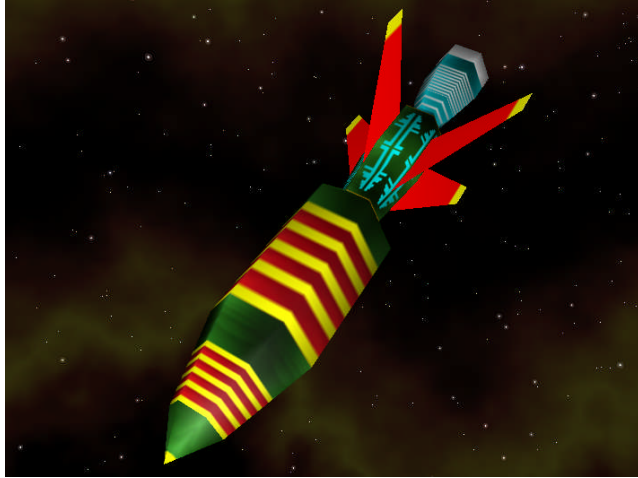
10.1.16 VULCAN'S HAMMER



VULCAN'S HAMMER STATISTICS

CLASS	6
TYPE	DESTRUCTIVE
DAMAGE	6000
VELOCITY	10
WEIGHT	10 Tons
LENGTH	17 Feet

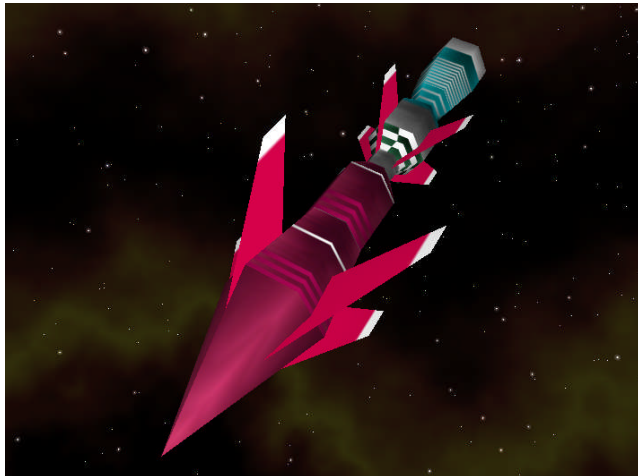
10.1.17 VENDETTA



VENDETTA STATISTICS

CLASS	6
TYPE	EM SHOCKWAVE
DAMAGE	64 Shield Units
VELOCITY	10
WEIGHT	10 Tons
LENGTH	17 Feet

10.1.18 FURY



FURY STATISTICS

CLASS	6
TYPE	CLUSTER
SUBMISSILES	2 x WRATH 1 x TEMPEST
VELOCITY	8
WEIGHT	15 Tons
LENGTH	17 Feet

10.2 RAILGUNS

A Railgun is an Electromagnetic weapon that fires a projectile (or armature) using an electric current. The barrel of the gun contains a pair of rails which are connected to an enormous power supply (typically a compulsator) which is contained in the distinctive hook like appendage at the rear. An electric current passing along the rails and through the armature generates a magnetic field which propels the projectile with great speed along the barrel and out through the muzzle of the gun.

Railguns have a distinct advantage over Lasers in that they are not inhibited by shields. However their range is inferior and they typically require more skill to use as a trajectory to the target must be calculated.

10.2.1 CLASS 1



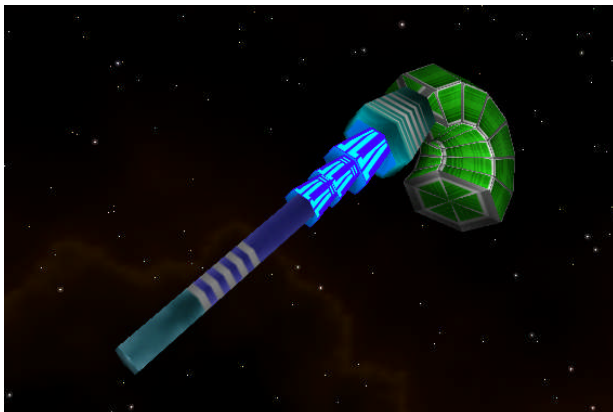
CLASS 1 RAILGUN STATISTICS	
DAMAGE	7
RANGE	1400 Feet
VELOCITY	14
WEIGHT	1 Ton

10.2.2 CLASS 2



CLASS 2 RAILGUN STATISTICS	
DAMAGE	10
RANGE	1400 Feet
VELOCITY	14
WEIGHT	1 Ton

10.2.3 CLASS 3



CLASS 3 RAILGUN STATISTICS	
DAMAGE	14
RANGE	1400 Feet
VELOCITY	14
WEIGHT	2 Tons

10.2.4 CLASS 4



CLASS 4 RAILGUN STATISTICS	
DAMAGE	18
RANGE	1400 Feet
VELOCITY	14
WEIGHT	3 Tons

10.2.5 CLASS 5



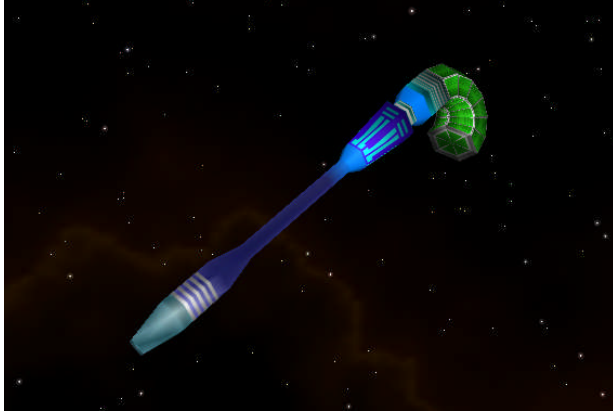
CLASS 5 RAILGUN STATISTICS	
DAMAGE	22
RANGE	1400 Feet
VELOCITY	14
WEIGHT	4 Tons

10.2.6 CLASS 6



CLASS 6 RAILGUN STATISTICS	
DAMAGE	26
RANGE	1400 Feet
VELOCITY	14
WEIGHT	5 Tons

10.2.7 CLASS 7



CLASS 7 RAILGUN STATISTICS	
DAMAGE	30
RANGE	1400 Feet
VELOCITY	14
WEIGHT	7 Tons

10.2.8 CLASS 8



CLASS 8 RAILGUN STATISTICS	
DAMAGE	35
RANGE	1400 Feet
VELOCITY	14
WEIGHT	9 Tons

10.2.9 CLASS 9



CLASS 9 RAILGUN STATISTICS	
DAMAGE	40
RANGE	1400 Feet
VELOCITY	14
WEIGHT	10 Tons

10.3 LASERS

Light Amplification by Stimulated Emission of Radiation, the Laser comes in two main varieties, either crystalline or gas and both types are capable of delivering an intense beam of electromagnetic radiation. Crystalline Lasers typically use large rods of Ruby or Titanium Sapphire and place a heavy burden on the supply of gemstones. Gas Lasers tend to favour Argon or CO₂ and these are held in a tube which is energised by passing an electric current through it.

The main disadvantage of a Laser as a weapon is that its energy can be blocked relatively easily. A century ago this amounted to something as unsophisticated as a fog generator but these days polarising filters are universally employed as a shielding device.

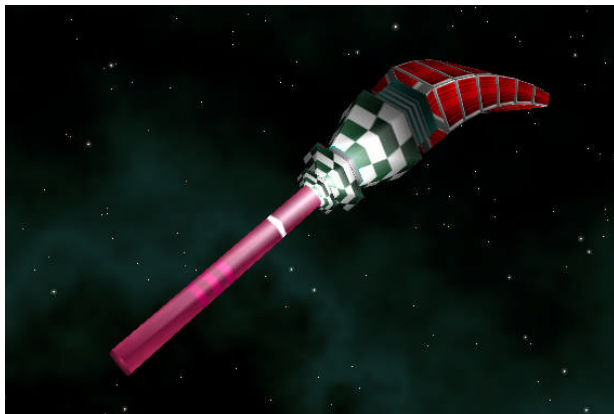
This severe disadvantage however is mitigated by their enormous range and ease of use. Since the velocity of the weapon is the speed of light then no trajectory needs to be calculated and the gun can be aimed directly at its target. For small fast moving targets which are capable of carrying only a limited number of shield units then the Laser has a considerable advantage over a Railgun of the same class.

10.3.1 CLASS 1



CLASS 1 LASER STATISTICS	
SHIELD DAMAGE	20
HULL DAMAGE	2
RANGE	4000 Feet
WEIGHT	1 Ton

10.3.2 CLASS 2



CLASS 2 LASER STATISTICS	
SHIELD DAMAGE	40
HULL DAMAGE	4
RANGE	4000 Feet
WEIGHT	1 Ton

10.3.3 CLASS 3



CLASS 3 LASER STATISTICS	
SHIELD DAMAGE	60
HULL DAMAGE	6
RANGE	4000 Feet
WEIGHT	2 Tons

10.3.4 CLASS 4



CLASS 4 LASER STATISTICS	
SHIELD DAMAGE	80
HULL DAMAGE	8
RANGE	4000 Feet
WEIGHT	3 Tons

10.3.5 CLASS 5



CLASS 5 LASER STATISTICS	
SHIELD DAMAGE	100
HULL DAMAGE	10
RANGE	4000 Feet
WEIGHT	4 Tons

10.3.6 CLASS 6



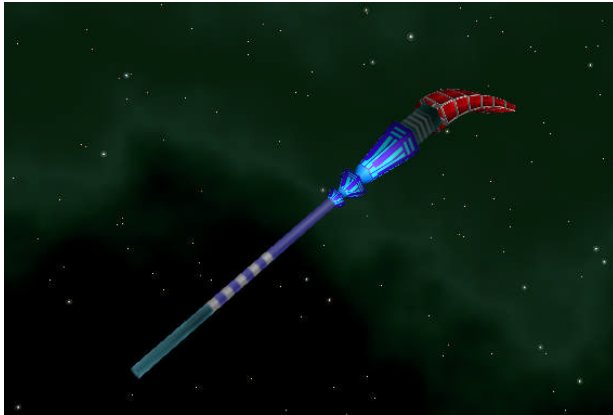
CLASS 6 LASER STATISTICS	
SHIELD DAMAGE	140
HULL DAMAGE	14
RANGE	4000 Feet
WEIGHT	6 Tons

10.3.7 CLASS 7



CLASS 7 LASER STATISTICS	
SHIELD DAMAGE	160
HULL DAMAGE	16
RANGE	4000 Feet
WEIGHT	7 Tons

10.3.8 CLASS 8



CLASS 8 LASER STATISTICS	
SHIELD DAMAGE	180
HULL DAMAGE	14
RANGE	4000 Feet
WEIGHT	9 Tons

10.3.9 CLASS 9



CLASS 9 LASER STATISTICS	
SHIELD DAMAGE	200
HULL DAMAGE	20
RANGE	4000 Feet
WEIGHT	10 Tons

10.4 PLASMA CANNONS

It may seem hard to believe now, but 30 years ago the missile and ballistics industry was flat on its back. The relatively high cost of a weapon that could only be used once, combined with increasingly effective Laser and Particle weapons conspired to create an environment which threatened its entire existence. The crisis finally came to a head when a number of spacecraft manufacturers were rumoured to be considering saving costs by not fitting missile launchers. A consortium of ordnance suppliers was formed to develop a strategy for staving off the immediate threat and the Plasma Cannon was the result.

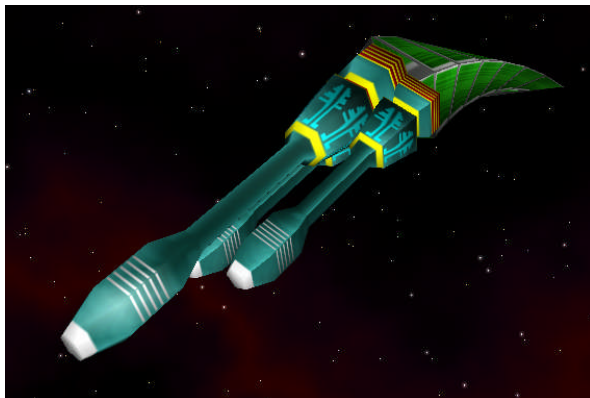
The Plasma Cannon is a heavy duty Railgun which can be fitted to a ship's missile launcher as an auxiliary weapon. Using exotic and highly classified heat resistant materials developed to withstand the extreme conditions exhibited by rocket engines the Plasma Cannon has solved the problem of melting rails exhibited by a typical Railgun. Using secondary and tertiary magnetic fields the weapon is capable of accelerating its projectile to such a high velocity that it transcends into plasma which is capable of damaging shields, but is not inhibited by them. Hull damage is also high and their superior velocity also makes them easier to aim, though not as straightforward as Lasers.

10.4.1 CLASS 1



CLASS 1 PLASMA CANNON STATISTICS	
SHIELD DAMAGE	200
HULL DAMAGE	50
RANGE	2000 Feet
WEIGHT	4 Tons

10.4.2 CLASS 2



CLASS 2 PLASMA CANNON STATISTICS	
SHIELD DAMAGE	400
HULL DAMAGE	70
RANGE	2000 Feet
WEIGHT	8 Tons

10.4.3 CLASS 3



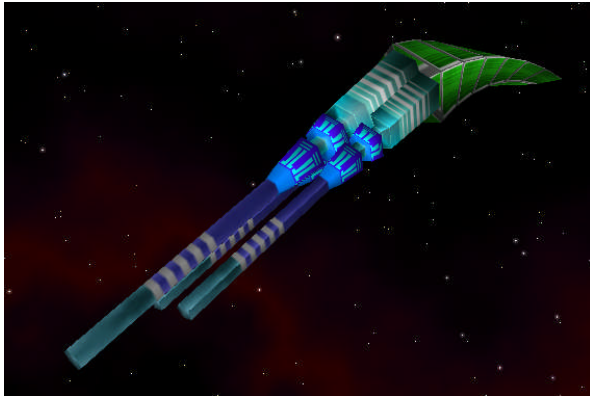
CLASS 3 PLASMA CANNON STATISTICS	
SHIELD DAMAGE	600
HULL DAMAGE	100
RANGE	2000 Feet
WEIGHT	16 Tons

10.4.4 CLASS 4



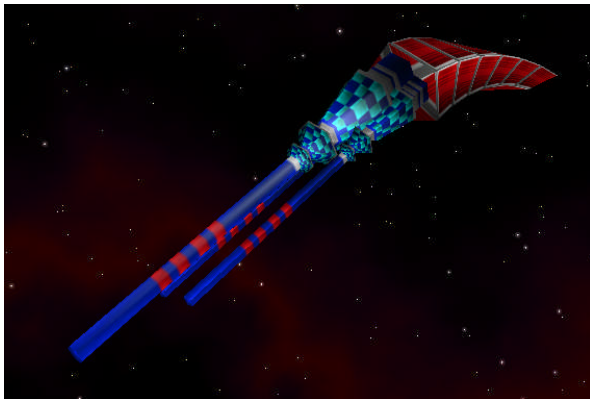
CLASS 4 PLASMA CANNON STATISTICS	
SHIELD DAMAGE	1000
HULL DAMAGE	140
RANGE	2000 Feet
WEIGHT	16 Tons

10.4.5 CLASS 5



CLASS 5 PLASMA CANNON STATISTICS	
SHIELD DAMAGE	1200
HULL DAMAGE	180
RANGE	2000 Feet
WEIGHT	16 Tons

10.4.6 CLASS 6



CLASS 6 PLASMA CANNON STATISTICS	
SHIELD DAMAGE	1400
HULL DAMAGE	200
RANGE	2000 Feet
WEIGHT	20 Tons

SECTION 11: EQUIPMENT

Blurb to be added.

11.1 SHIELD UNITS

A shield unit is a defence against Electromagnetic radiation and by virtue of this provides protection against Laser damage. Each Shield Unit is able to absorb 100MW of energy and can regenerate at a rate of 30KW per second. Fitting extra shield units has a cumulative effect on both these figures and as an example, four shields units are able to absorb 400MW of energy and recharge the polarising field at a rate of 120KW/s.

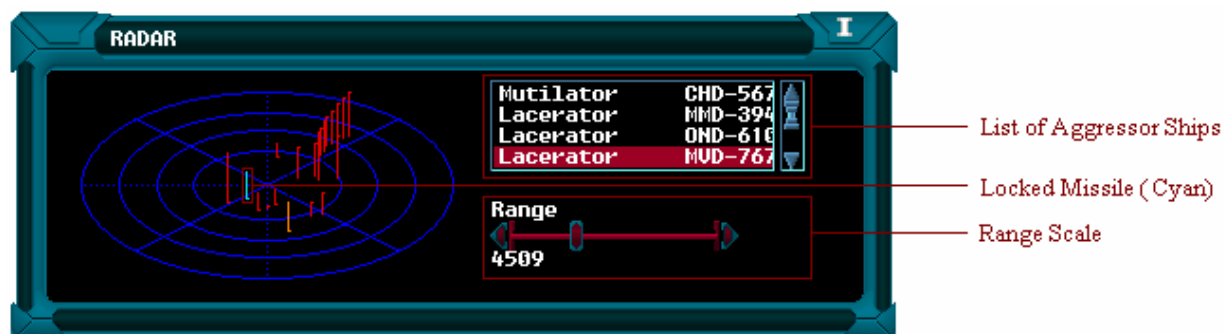
Refer to Section 5.1 for detailed information on the operation of Shield Units.

11.2 ENHANCED SHORT RANGE SCANNERS

Enhancement of the short-range scanners significantly improves the Radar that is fitted as standard to all Spacecraft by offering the following extra features:

1. Five fold increase in range.
2. Resolution adjustment.
3. List of registered aggressor vessels
4. Visual indication and audible warning of Missiles locked onto your Spacecraft

The illustration below describes the appearance of the enhancements.



11.3 ENHANCED LONG RANGE SCANNERS

Enhanced Long Range Scanners extend the range of the standard item so that all spacecraft within the local star system can be tracked.

11.4 TRACKING COMPUTERS

The tracking computer is an augment to the Enhanced Long Range Scanner that allows the position of the currently targeted spacecraft to be plotted within the Solar System Map. Although the device can be used in conjunction with the standard scanner its benefits are severely compromised.

11.5 SIGNAL INTERPRETER

A signal interpreter is capable of analysing the raw data from the scanners so that a comprehensive set of details concerning any targeted spacecraft can be displayed within the 'Target Ship Status' screen.

11.6 TRADING COMPUTER

The standard trading computer establishes a communications link with the cities and space stations within the local star system so that the details of available commodities can be displayed via the Solar System Map.

11.7 ENHANCED TRADING COMPUTER

The enhanced trading computer replaces the standard unit by extending its range to include systems selected from within the Galactic Map.

11.8 AFTERBURNER

The afterburner can be used to double the free flight velocity of the spacecraft by draining the energy banks of the shield units. Fitting extra shield units will increase the burn time, however the device drains energy at a faster rate as available energy increases.

To activate the afterburner the pilot should simply keep the accelerator key (i.e. '+') pressed.

11.9 TRAJECTORY COMPUTER

The trajectory computer is an invaluable aid to those pilots that favour the use of Rail guns rather than Lasers. The device will plot the course of the required target spacecraft and draw a cross hair to indicate where the weapons should aimed in order to hit it.

11.10 OBSERVATION CAMERA

The observation camera is activated/ deactivated using the 'R' key and provides rear or remote view of your spacecraft.

11.11 DEBRIS COLLECTOR

A Debris collector can purchased in preference to a heavy cannon and is fitted to the missile launcher in its place. Four classes of collector exist which are capable of scavenging debris of increasing size. The equipment can be used to retrieve cargo canisters that have been shed during the destruction of a spacecraft or they can be used to collect mineral ore that has been scattered due to asteroid mining activity.

11.12 DEBRIS ANALYSER

An augment to the Long Range Scanner that can be used determine the contents of cargo canisters. This piece equipment should be regarded as essential if a debris collector has been fitted.

11.13 ASTEROID ANALYSER

An extension to the Long Range Scanners which allows the mineral composition of an asteroid to be determined.

SECTION 12: SPACECRAFT

Spacecraft fall into two distinct categories, those capable of atmospheric flight and those which are not. The ability to fly within a planets atmosphere such that it must overcome the effects of a gravitational field places an extremely demanding set of requirements on the design of any spacecraft. Not only must it be of relatively light construction, it must also be sound aerodynamically and consequently the superior manufacturing materials required mean that such vessels are far more expensive than those that are only capable of space travel.

Most large freighters are constructed from heavier but cheaper steel alloys and have no need of expensive wings. As a result such vessels enjoy a considerable price advantage over smaller atmosphere capable craft.

The rest of this section gives a detailed description of the most common Spacecraft that are likely to be encountered in the charted star systems.

12.1 CONDOR

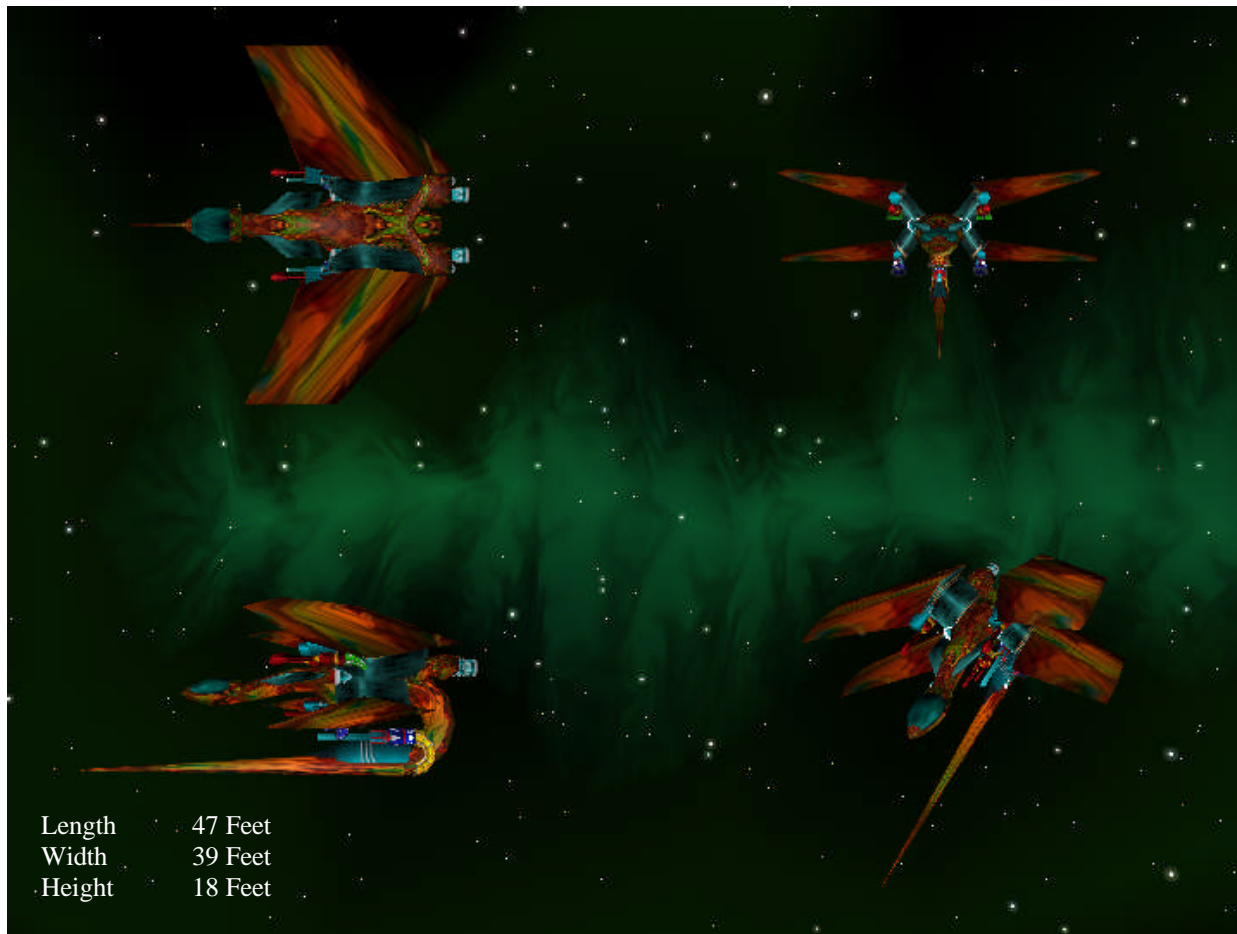


CONDOR SHIP STATISTICS		COMPONENT DAMAGE RATING	
Maximum Velocity	5.4	Engine x 6	90
Acceleration	0.3	Booster x 2	310
Deceleration	0.2	Retro Engine x 2	70
Rate of Turn	90 Degrees/ Second	Engine Cowling	170
Cargo Capacity	54 Tons	Fuselage	4,370
Shield Area	18,000 Square Feet	Neck	2,840
Shield Units for 100% Strength	1.8	Cockpit	870
		Front Upper Leg x 2	690
Length	53 Feet	Front Lower Leg x 2	1,080
Width	73 Feet	Front Foot x 2	60
Height	15 Feet	Wing x 2	3,310
No. Class 2 Plasma Mounts	1		
No. Class 3 Gun Mounts	2		
No. Class 2 Missile Launchers	1		

Originally designed as a transport for planets that possess a thin atmosphere, the Dehaviland Condor is a Ship that is now something of an anachronism. The huge wingspan that was originally such an asset now makes the ship ridiculously exposed to attack and advances in engine technology make its high lift wings redundant. Poor armaments don't help and this bird in reality is little more than a sitting duck. Although impractical, its elegant lines still attract many pilots and consequently it still commands a high market value. The fact that it was withdrawn from production 10 years ago, taken together with its relative vulnerability means that the fast dwindling supply of these ships is only likely to elevate the market price further.



12.2 HORNET

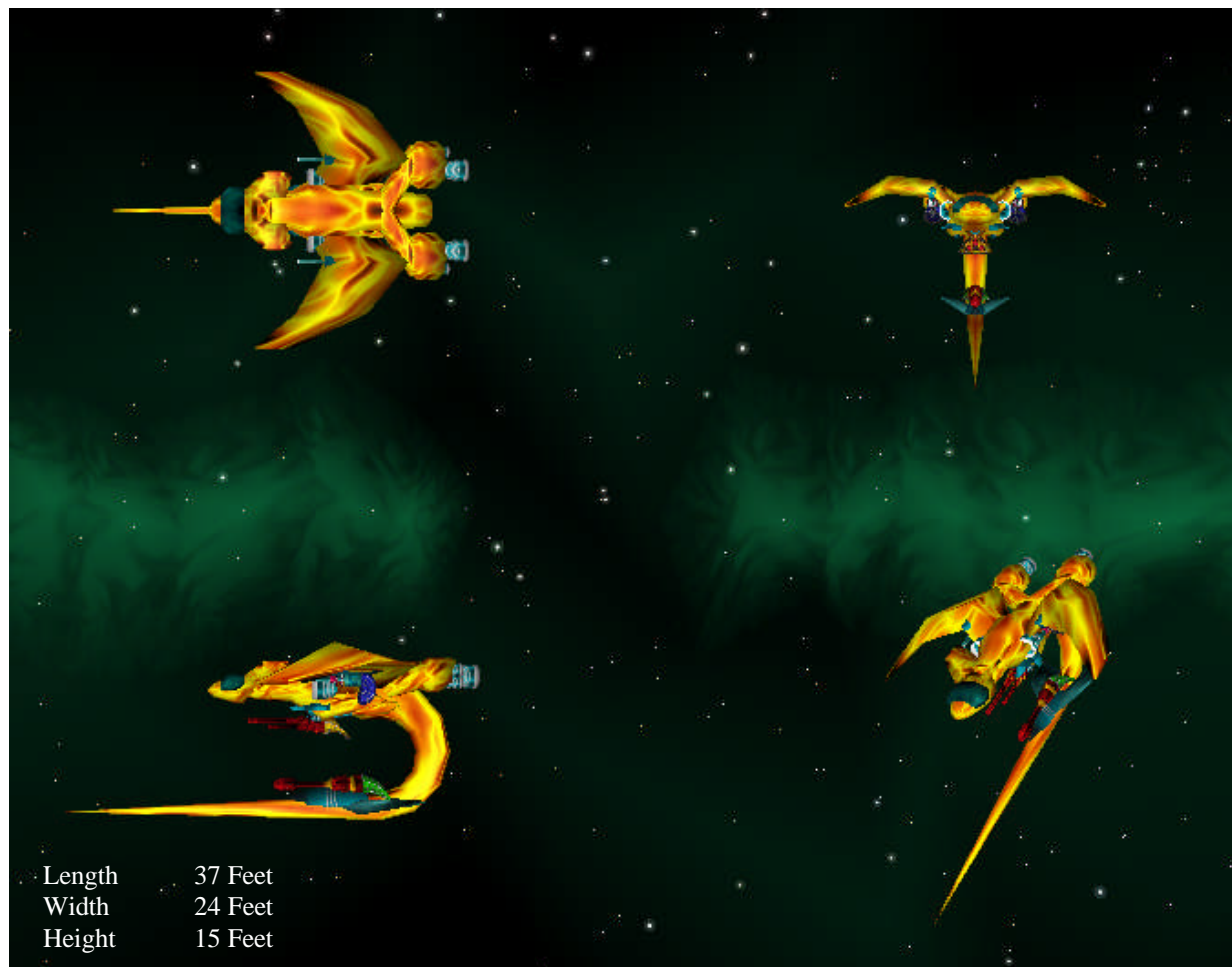


HORNET SHIP STATISTICS		COMPONENT DAMAGE RATING	
Maximum Velocity	9.0	Engine x 4	90
Acceleration	0.7	Booster x 2	250
Deceleration	0.3	Retro Engine x 2	70
Rate of Turn	150 Degrees/ Second	Engine Cowling x 2	130
Cargo Capacity	19 Tons	Engine Mounting x 2	410
Shield Area	8,500 Square Feet	Fuselage	2,130
Shield Units for 100% Strength	0.85	Neck	790
		Cockpit	700
Length	47 Feet	Front Upper Leg x 2	540
Width	39 Feet	Front Lower Leg x 2	420
Height	18 Feet	Front Foot x 2	20
		Upper Wing x 2	1,220
No. Class 1 Plasma Mounts	1	Lower Wing x 2	1,070
No. Class 2 Gun Mounts	2	Upper Tail Boom	520
No. Class 3 Gun Mounts	2	Lower Tail Boom	1,890
No. Class 4 Gun Mounts	1		
No. Class 1 Missile Launchers	1		

The latest addition to the Supermarine stable has become an instant hit with pilots that favour an aggressive flying style. Six weapon positions make this ship a gun platform without peer when compared to other small fighters. Neither speed nor manoeuvrability have been compromised and there are only a few ships currently available that can out run it. Officially designed for the military as a Capital Ship escort, many suspect that its real market positioning was to take advantage of the lucrative privateer sector. Although Supermarine strongly denies this claim, sales seem to confirm the rumours and if you own a Hornet then expect to attract the attention of the local constabulary.



12.3 TAIPAN

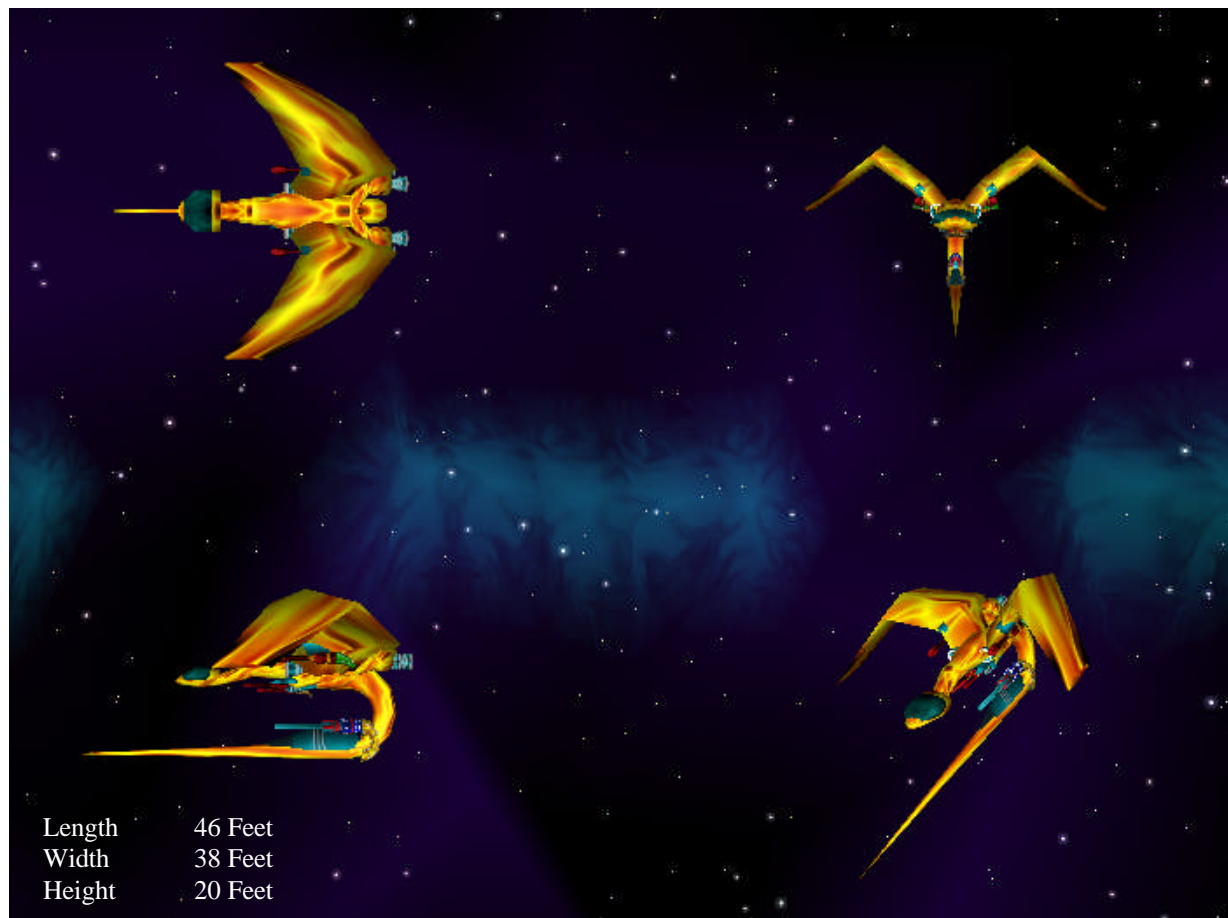


TAIPAN SHIP STATISTICS		COMPONENT DAMAGE RATING	
Maximum Velocity	9.2	Engine x 4	90
Acceleration	0.7	Booster x 2	250
Deceleration	0.4	Retro Engine x 2	70
Rate of Turn	180 Degrees/ Second	Engine Cowling x 2	130
Cargo Capacity	8 Tons	Engine Mounting x 2	410
Shield Area	5,500 Square Feet	Fuselage	1,260
Shield Units for 100% Strength	0.6	Neck	80
		Cockpit	300
Length	37 Feet	Front Upper Leg x 2	390
Width	24 Feet	Front Lower Leg x 2	570
Height	15 Feet	Front Foot x 2	20
		Wing x 2	360
No. Class 1 Plasma Mounts	1	Upper Tail Boom	520
No. Class 2 Gun Mounts	2	Lower Tail Boom	1,060
No. Class 3 Gun Mounts	1		
No. Class 1 Missile Launchers	1		

In its day the Taipan was the most feared fighting ship that roamed the space lanes. The then revolutionary tail boom, which allowed an oversize cannon to be installed, was in reality nothing more than a modified hydrofoil – a direct result of Supermarine's exploitation of the niche aquatic planet market. Despite what would at first sight appear to be a somewhat shaky design philosophy the result exceeded all expectations and the ship had a real edge over the competition in terms of firepower. The use of twin-engine clusters made the ship hard to disable and its low centre of gravity gave excellent manoeuvrability, although some deemed it downright twitchy. Later advances in wing design have now curtailed the advantages of the tail boom and its once outstanding firepower is only average by modern standards. Despite this, the design is still popular and its speed and agility still make it a formidable opponent.

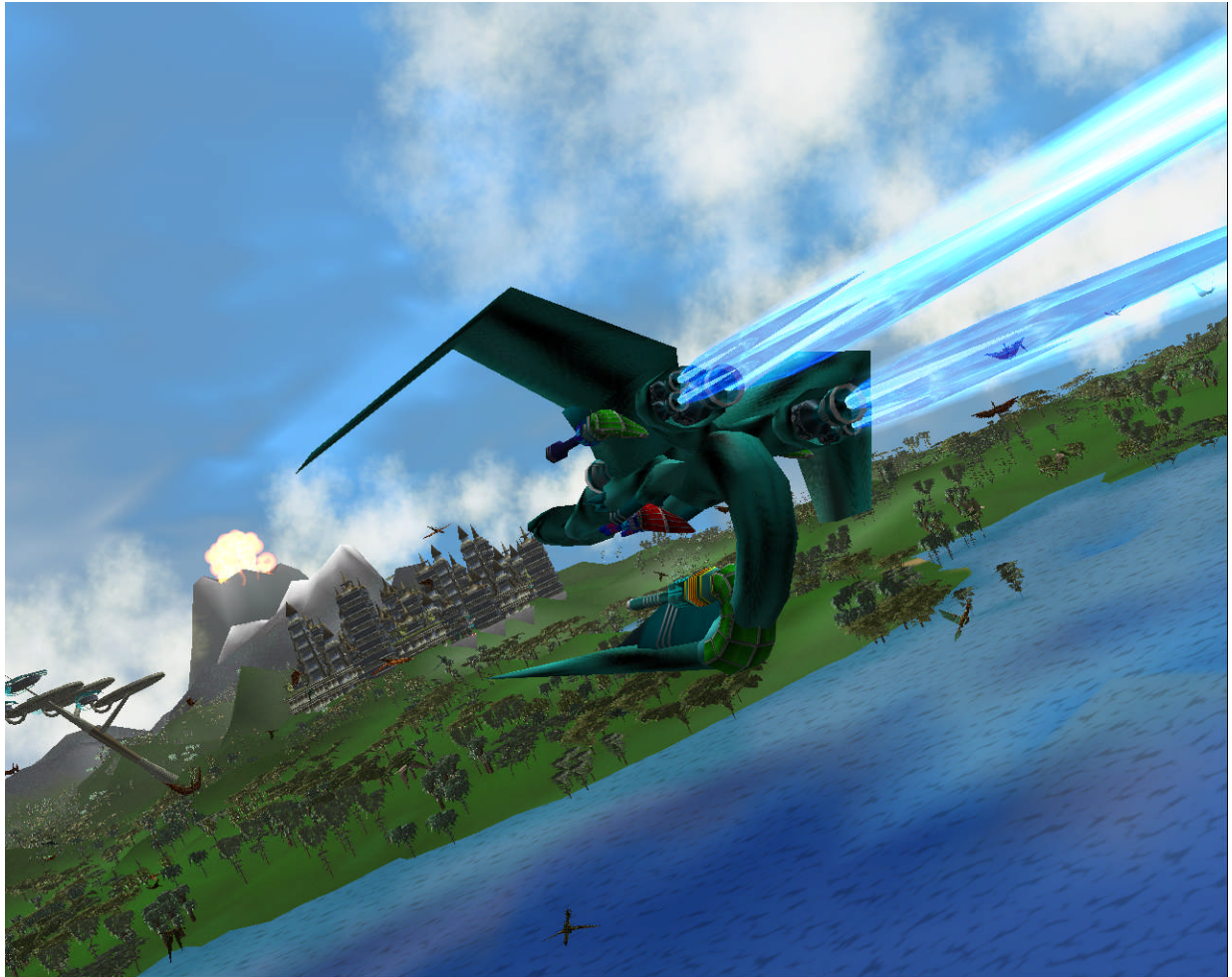


12.4 BOOMSLANG



BOOMSLANG SHIP STATISTICS		COMPONENT DAMAGE RATING	
Maximum Velocity	8.6	Engine x 4	90
Acceleration	0.5	Booster x 2	250
Deceleration	0.4	Retro Engine x 2	70
Rate of Turn	150 Degrees/ Second	Engine Cowling x 2	130
Cargo Capacity	11 Tons	Engine Mounting x 2	410
Shield Area	10,800 Square Feet	Fuselage	2,130
Shield Units for 100% Strength	1.1	Neck	360
		Cockpit	530
Length	46 Feet	Front Upper Leg x 2	470
Width	38 Feet	Front Lower Leg x 2	730
Height	20 Feet	Front Foot x 2	40
		Wing x 2	1,050
No. Class 1 Plasma Mounts	1	Upper Tail Boom	520
No. Class 3 Gun Mounts	2	Lower Tail Boom	1,840
No. Class 4 Gun Mounts	1		
No. Class 1 Missile Launchers	1		

Supermarine responded quickly to the unexpected success of the Taipan and the Boomslang was delivered to an expectant public only two years later. Originally intended to address the limited cargo capacity of its sister ship, the design team decided to re-focus on the more exciting area of weapon deployment instead. Misleading the company directors by stressing the need for larger wings to carry a heavier load they promptly forgot to upgrade the fuselage and concentrated on advancing the weapon array. An upgrade to Class 3 weapon mounts on the wings and Class 4 on the Tail was the result and the slight improvements with respect to the hold can be described as marginal at best.



12.5 LEVIATHAN

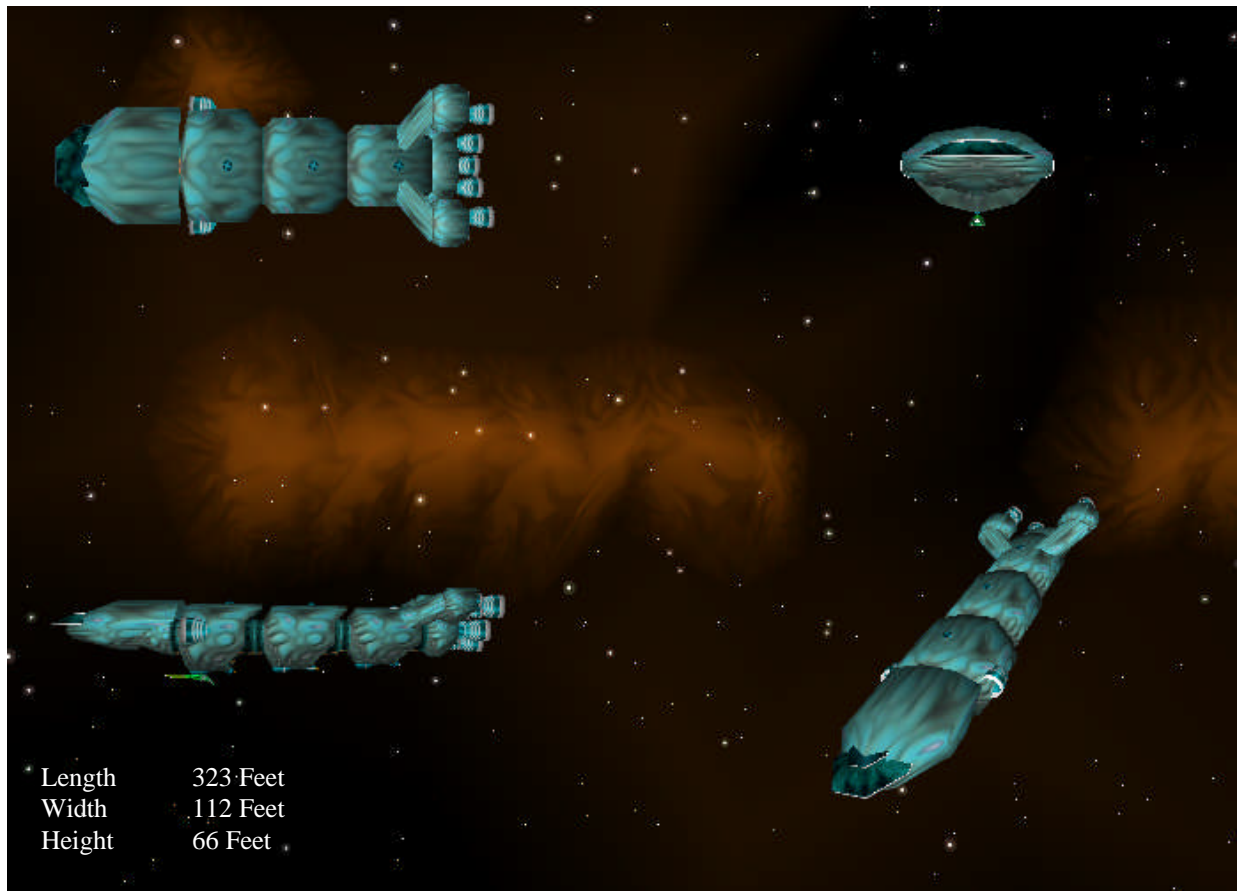


LEVIATHAN SHIP STATISTICS		COMPONENT DAMAGE RATING	
Maximum Velocity	2.4	Engine x 8	6000
Acceleration	0.1	Booster x 6	19,960
Deceleration	0.1	Retro Engine x 2	4,800
Rate of Turn	30 Degrees/ Second	Engine Cowling x 2	9,930
Cargo Capacity	50,889 Tons	Engine Mounting x 2	38,800
Shield Area	500,000 Square Feet	Rear Engine Cowling x 1	21,040
Shield Units for 100% Strength	50	Aft Fuselage	54,720
		Mid Fuselage	60,000
Length	390 Feet	Fore Fuselage	60,000
Width	139 Feet	Neck	31,100
Height	87 Feet	Cabin & Bridge Area	60,000
No. Class 5 Plasma Mounts	1		
No. Class 5 Turrets	4		
No. Class 6 Turrets	2		
No. Class 5 Missile Launchers	2		
No. Class 6 Missile Launchers	1		

Originally commissioned by a consortium of Deuterium refiners as a fuel tanker, the Leviathan is one of the largest freighters ever built. Its hull compartments originally designed for holding liquids, have subsequently been modified by the manufacturer as demand for a huge bulk transport of other commodities has escalated. Its massive size and formidable weapon deployment make the Leviathan an intimidating sight and many pirates give it a wide berth despite the tempting value of its cargo.

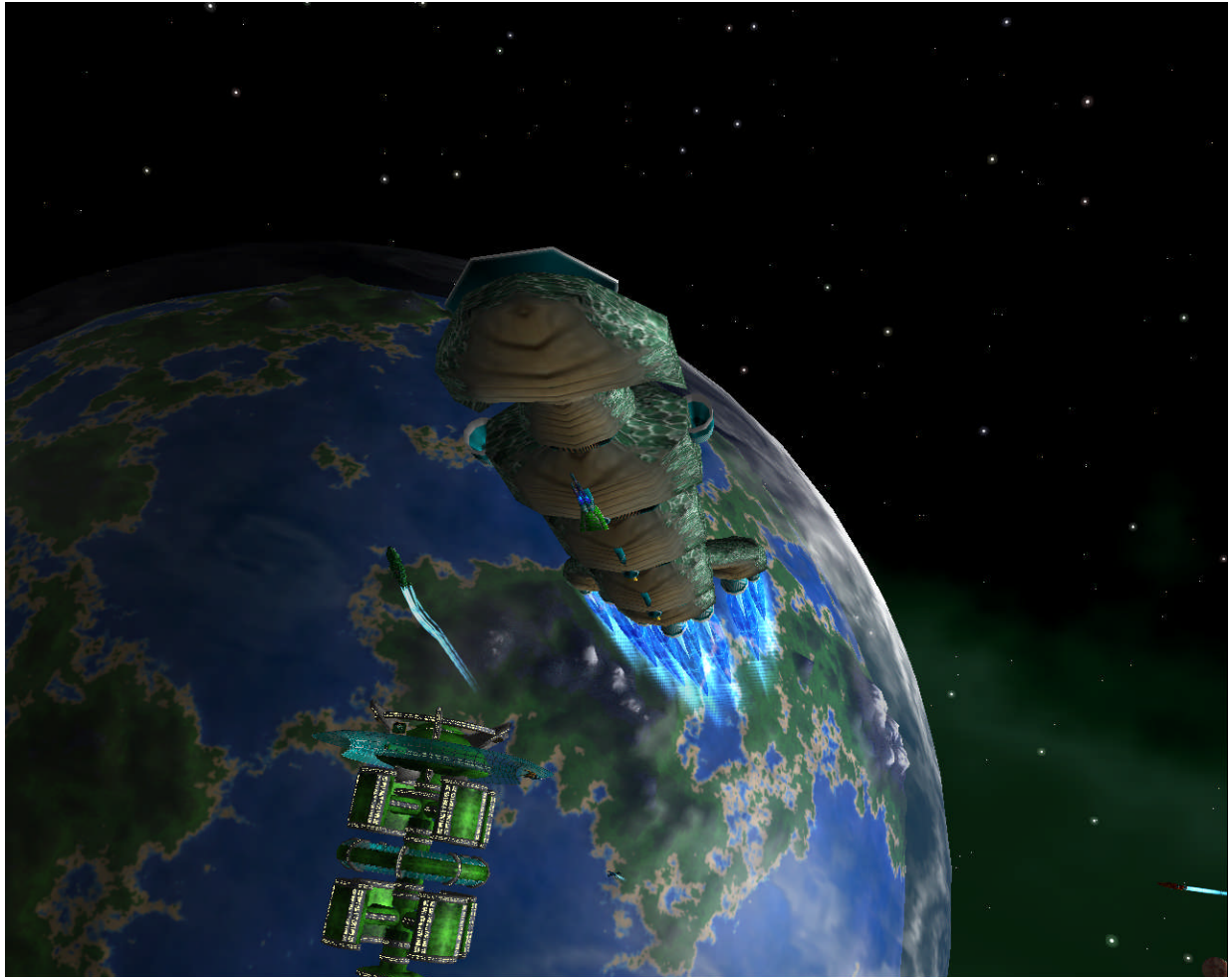


12.6 KRAKEN

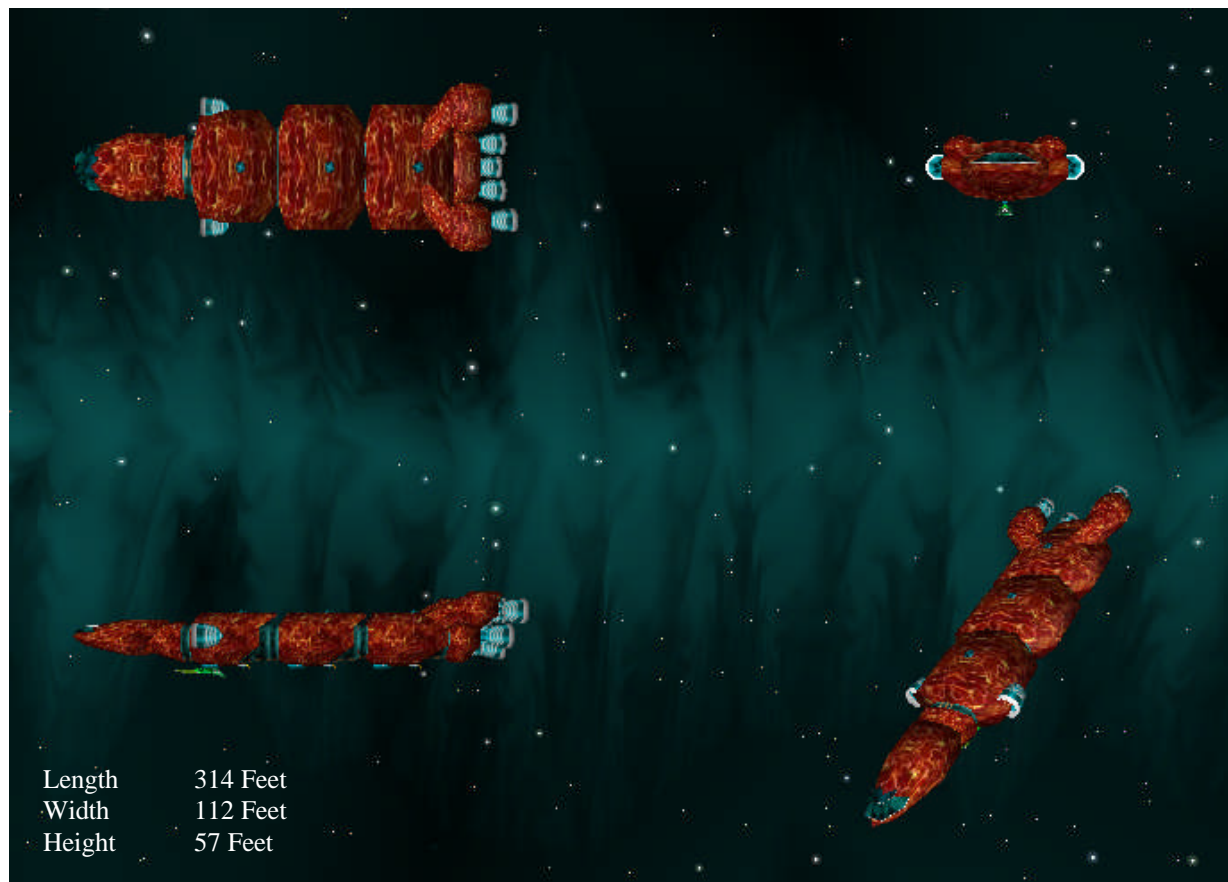


KRAKEN SHIP STATISTICS		COMPONENT DAMAGE RATING	
Maximum Velocity	2.7	Engine x 8	6000
Acceleration	0.1	Booster x 5	19,960
Deceleration	0.1	Retro Engine x 2	4,800
Rate of Turn	36 Degrees/ Second	Engine Cowling x 2	9,930
Cargo Capacity	23,839 Tons	Engine Mounting x 2	38,800
Shield Area	345,000 Square Feet	Rear Engine Cowling x 1	14,220
Shield Units for 100% Strength	35	Aft Fuselage	59,870
		Mid Fuselage	60,000
Length	323 Feet	Fore Fuselage	60,000
Width	112 Feet	Neck	11,950
Height	66 Feet	Cabin & Bridge Area	60,000
No. Class 5 Plasma Mounts	1		
No. Class 5 Turrets	6		
No. Class 5 Missile Launchers	3		

The Kraken was developed as a smaller version of the Leviathan and as a direct competitor to the Titan. Many hauliers felt that the Leviathan was simply too large and their cargo bays were frequently half empty. The extra fuel required to open a worm hole for such an enormous ship meant that runs between smaller star systems were often uneconomic. The Kraken displaces a far less extravagant volume than its sister ship and as a consequence offers considerable savings on its operating costs. The fact that the vessel has lost little in terms of fire power has made the Kraken a popular alternative to the Titan.

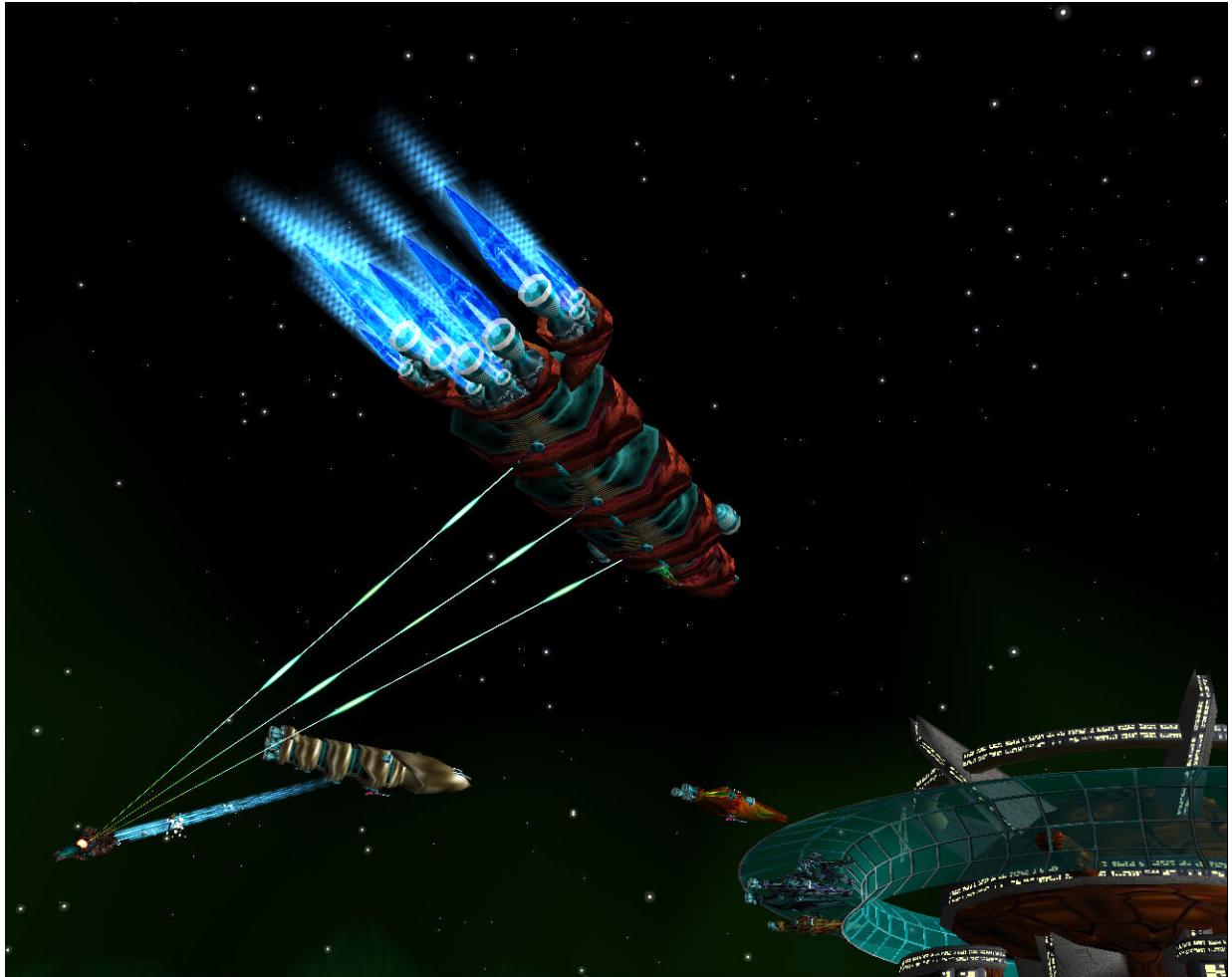


12.7 TITAN



TITAN SHIP STATISTICS		COMPONENT DAMAGE RATING	
Maximum Velocity	2.5	Engine x 8	6000
Acceleration	0.1	Booster x 5	19,960
Deceleration	0.1	Retro Engine x 2	4,800
Rate of Turn	30 Degrees/ Second	Engine Cowling x 2	9,930
Cargo Capacity	23,977 Tons	Engine Mounting x 2	38,800
Shield Area	325,000 Square Feet	Rear Engine Cowling x 1	14,220
Shield Units for 100% Strength	33	Aft Fuselage	60,000
		Mid Fuselage	60,000
Length	314 Feet	Fore Fuselage	60,000
Width	112 Feet	Neck	11,950
Height	57 Feet	Cabin & Bridge Area	60,000
No. Class 5 Plasma Mounts	1		
No. Class 5 Turrets	6		
No. Class 5 Missile Launchers	3		

This venerable design is widely regarded as the first super freighter and many manufacturers have copied its triple hull design. When the Titan was first launched it took the freighter market by storm as its formidable array of gun batteries allowed the traders to take on pirates on a more equal footing. Indeed in many Star Systems the Titan's ability to fend off attackers was seen as more effective in dealing with crime than the law enforcement agencies. The design still commands a loyal customer following and although relatively small by modern standards its competitive defence systems help make it a common sight throughout the known galaxy.

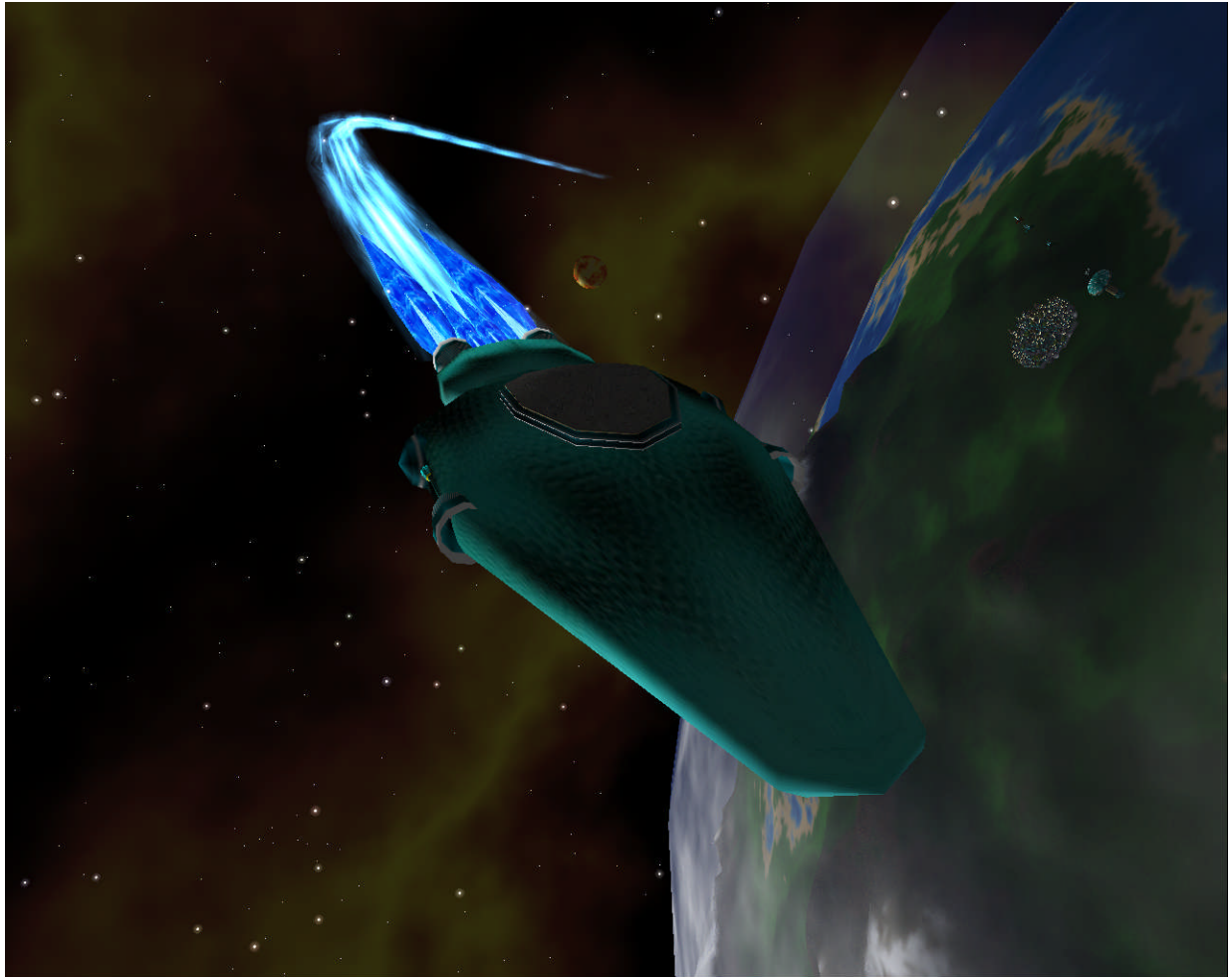


12.8 MAMMOTH

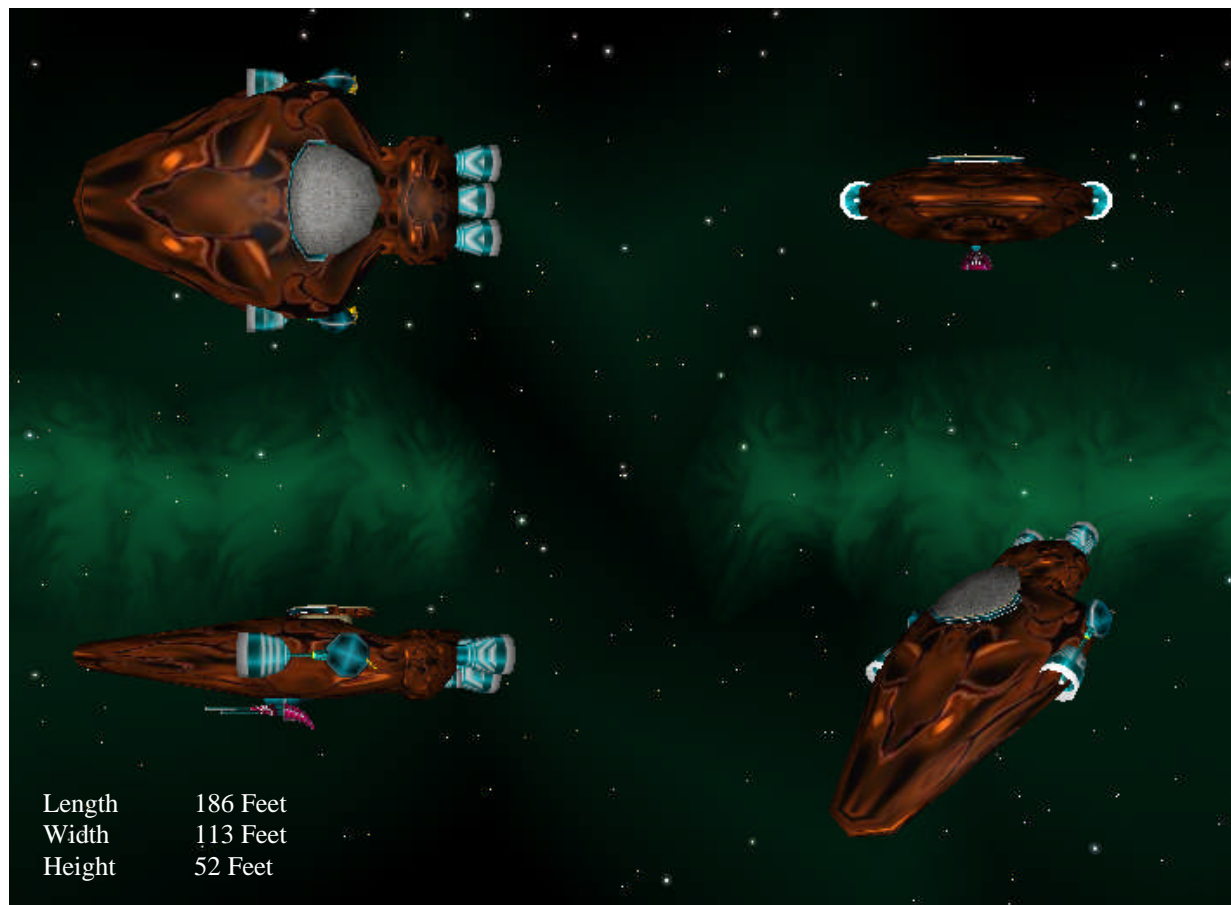


MAMMOTH SHIP STATISTICS		COMPONENT DAMAGE RATING	
Maximum Velocity	3.1	Engine x 5	6000
Acceleration	0.1	Booster x 2	19,960
Deceleration	0.1	Retro Engine x 2	4,800
Rate of Turn	45 Degrees/ Second	Engine Cowling x 1	14,040
Cargo Capacity	30,795 Tons	Fuselage	60,000
Shield Area	204,688 Square Feet	Bridge	22,080
Shield Units for 100% Strength	21		
Length	252 Feet		
Width	104 Feet		
Height	56 Feet		
No. Class 6 Plasma Mounts	1		
No. Class 9 Turrets	2		
No. Class 6 Missile Launchers	1		

The budget end of the heavy freighter market, the Mammoth in many ways is little more than a cargo bay with some engines attached. Although poorly served in terms of the quantity of its weapon mountings this is somewhat offset by their potential power. The twin turrets are particularly effective in guarding the vulnerable engine array, but this is at the expense of the ship's prow and the defence of this area depends on its massive hull plating and single plasma cannon. Despite this aspect many owners feel that the vessel's firepower is more than adequate since it's focused towards the area where it's most needed and the Mammoth forms the backbone of many logistic enterprises.

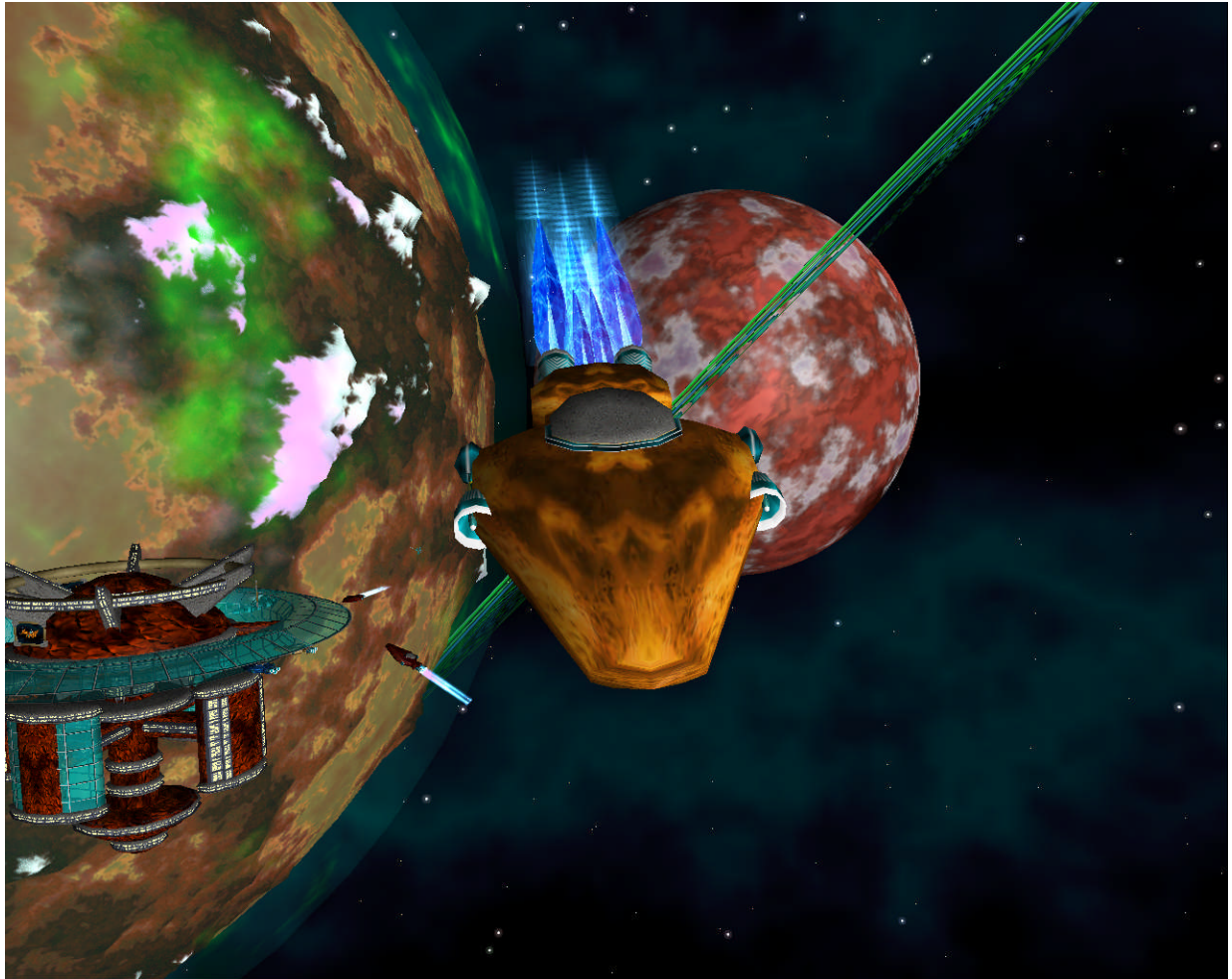


12.9 TUSKER

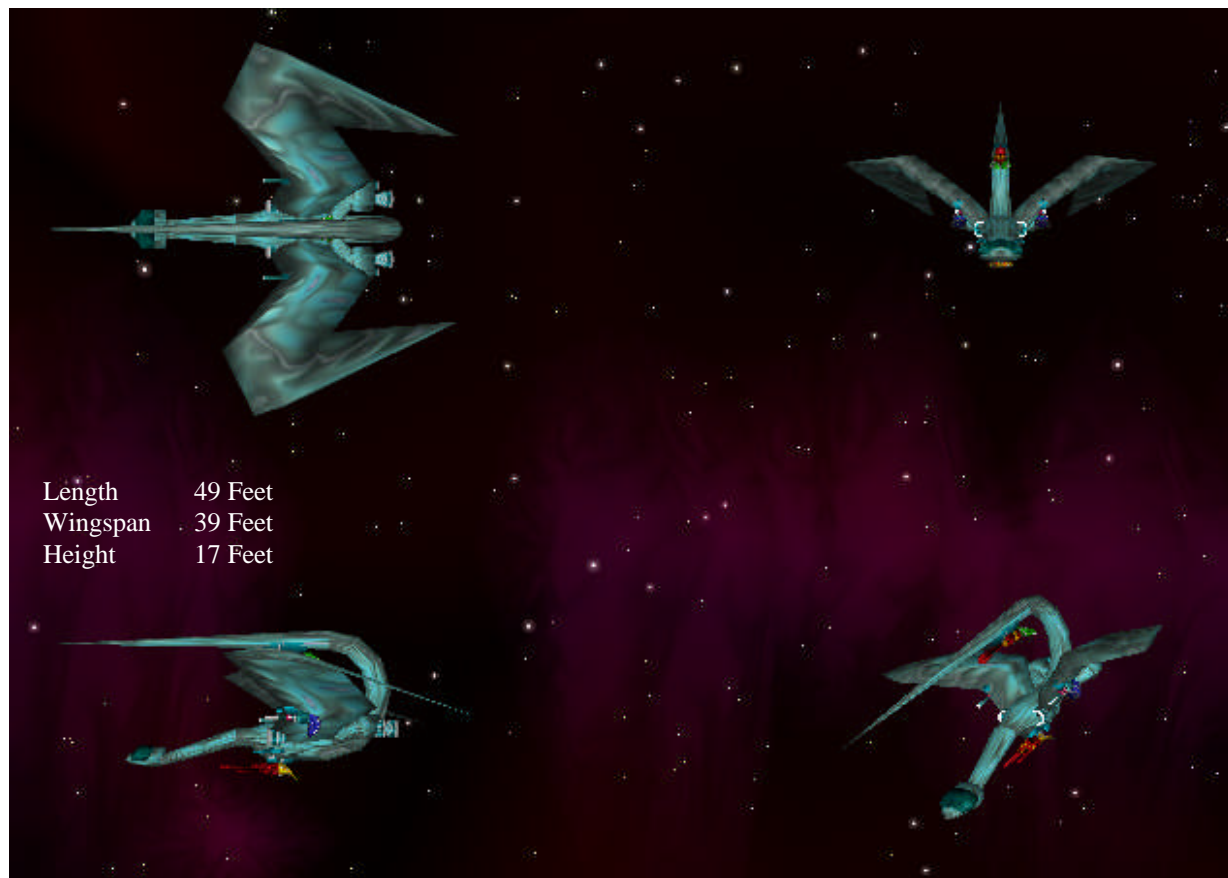


TUSKER SHIP STATISTICS		COMPONENT DAMAGE RATING	
Maximum Velocity	3.2	Engine x 4	6000
Acceleration	0.1	Booster x 3	19,960
Deceleration	0.1	Retro Engine x 2	4,800
Rate of Turn	54 Degrees/ Second	Engine Cowling x 1	14,220
Cargo Capacity	20,131 Tons	Fuselage	60,000
Shield Area	114,369 Square Feet	Bridge	9,270
Shield Units for 100% Strength	12		
Length	186 Feet		
Width	113 Feet		
Height	52 Feet		
No. Class 6 Plasma Mounts	1		
No. Class 9 Turrets	2		
No. Class 6 Missile Launchers	1		

The Tusker is the smaller sibling of the Mammoth and its entry level pricing policy makes it highly sought after by pilots wishing to break into bulk trading. The only major distinction between it and its sister ship is size and consequent cost advantage. The fact that the weapon systems have not been compromised in this respect means that new pilots are not put off by their hazardous occupation and tend to gravitate towards upgrading to the larger and more expensive Mammoth.



12.10 REAVER

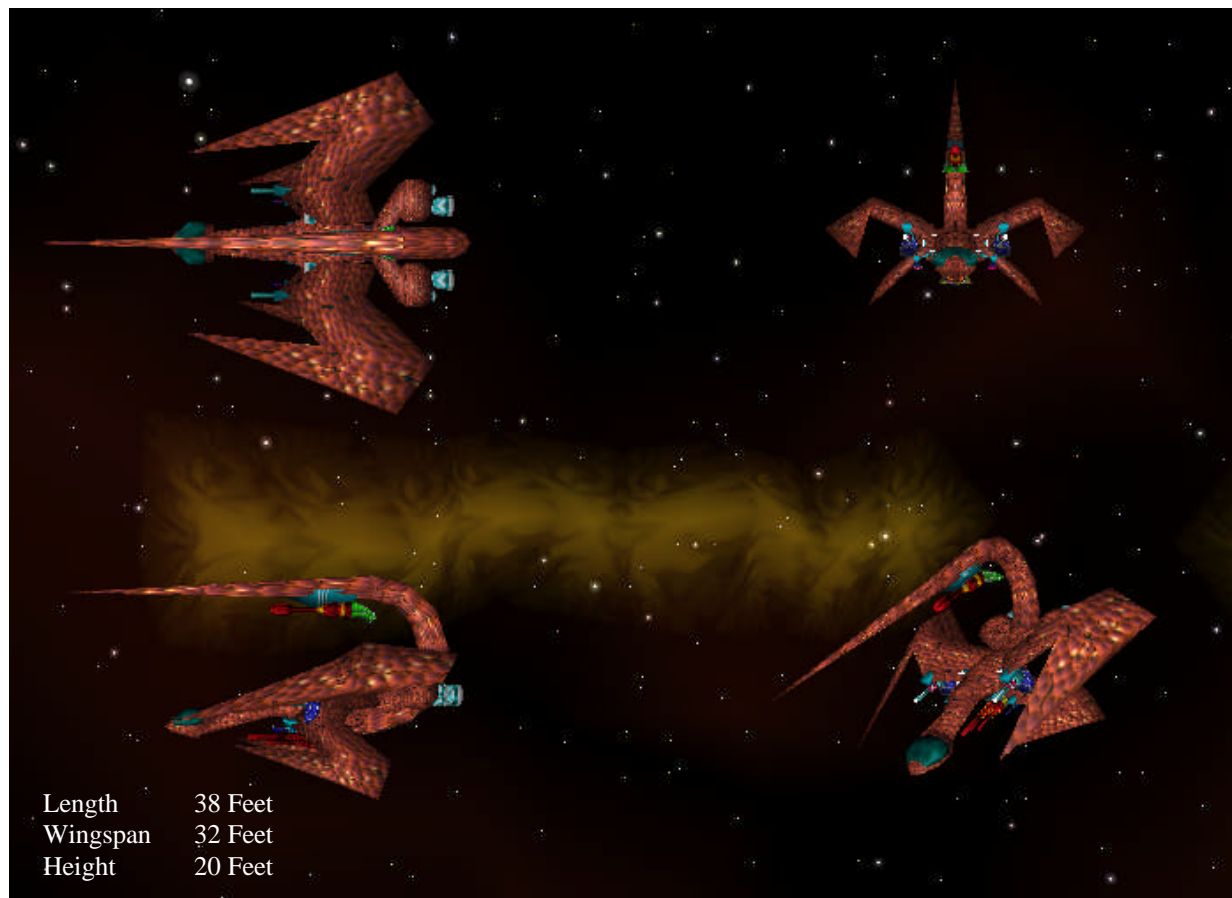


REAVER SHIP STATISTICS		COMPONENT DAMAGE RATING	
Maximum Velocity	8.7	Engine x 4	90
Acceleration	0.5	Booster x 2	250
Deceleration	0.3	Retro Engine x 2	70
Rate of Turn	180 Degrees/ Second	Engine Cowling x 2	130
Cargo Capacity	13 Tons	Engine Mounting x 2	410
Shield Area	11,000 Square Feet	Fuselage	1,600
Shield Units for 100% Strength	1.1	Neck	1000
		Cockpit	350
Length	49 Feet	Front Upper Leg x 2	240
Width	39 Feet	Front Lower Leg x 2	370
Height	17 Feet	Front Foot x 2	20
		Wing x 2	1770
No. Class 1 Plasma Mounts	1	Upper Tail Boom	810
No. Class 2 Gun Mounts	2	Lower Tail Boom	1,370
No. Class 3 Gun Mounts	1		
No. Class 1 Missile Launchers	1		

The Reaver's graceful lines have won it a loyal following amongst those who value style over substance. Though not a particularly bad craft, it doesn't excel in any particular area and a brief glance at its specification will reveal that it is rather average in every department. The ship's nearest rival is the aging Boomslang which possesses a similar top speed but with a superior weapon deployment and the Reaver appears to be rather feeble by comparison.



12.11 BEAUFIGHTER

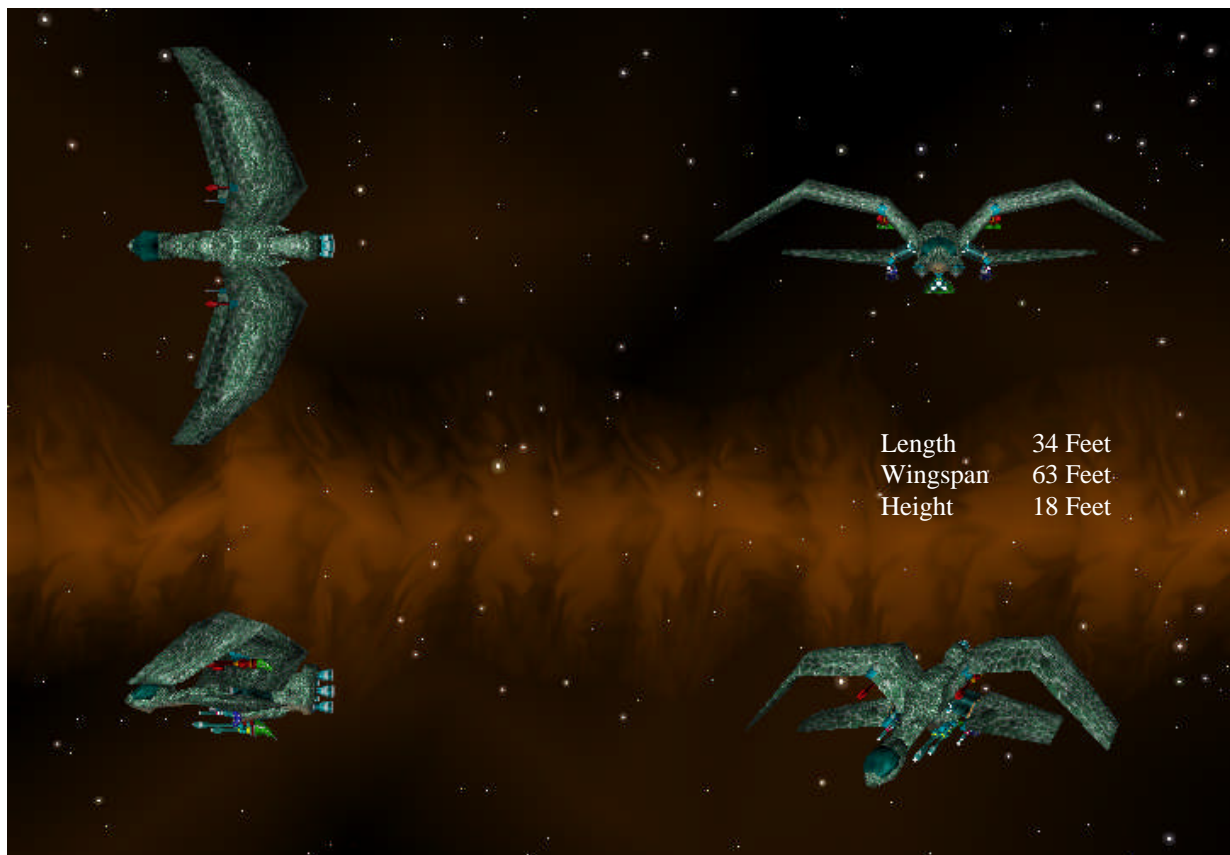


BEAUFIGHTER SHIP STATISTICS		COMPONENT DAMAGE RATING	
Maximum Velocity	7.8	Engine x 4	90
Acceleration	0.6	Booster x 2	250
Deceleration	0.3	Retro Engine x 2	70
Rate of Turn	120 Degrees/ Second	Engine Cowling x 2	130
Cargo Capacity	9 Tons	Engine Mounting x 2	410
Shield Area	6,100 Square Feet	Fuselage	1,370
Shield Units for 100% Strength	0.6	Neck	490
		Cockpit	320
Length	38 Feet	Front Upper Leg x 2	200
Width	32 Feet	Front Lower Leg x 2	320
Height	20 Feet	Front Foot x 2	20
		Upper Wing x 2	830
No. Class 1 Plasma Mounts	1	Lower Wing x 2	450
No. Class 1 Gun Mounts	2	Upper Tail Boom	810
No. Class 2 Gun Mounts	2	Lower Tail Boom	1,160
No. Class 3 Gun Mounts	1		
No. Class 1 Missile Launchers	1		

The engineers at the Bristol Spacecraft Company were supplied with but a single design mandate when the Beaufighter was developed which was to fit as many weapons as possible. The use of two pairs of wings and the incorporation of a tail boom allowed six cannons to be mounted which was a record at the time. The addition of so many projections added considerable weight to the vessel's superstructure and its top speed suffered as a direct result. This didn't deter many prospective owners however, who reasoned that they had no intention of running away and that a ship that could serve up a generous helping of death and destruction was too good to miss. Extremely popular amongst the criminal community the Beaufighter revels in its bad boy reputation.



12.12 WRAITH

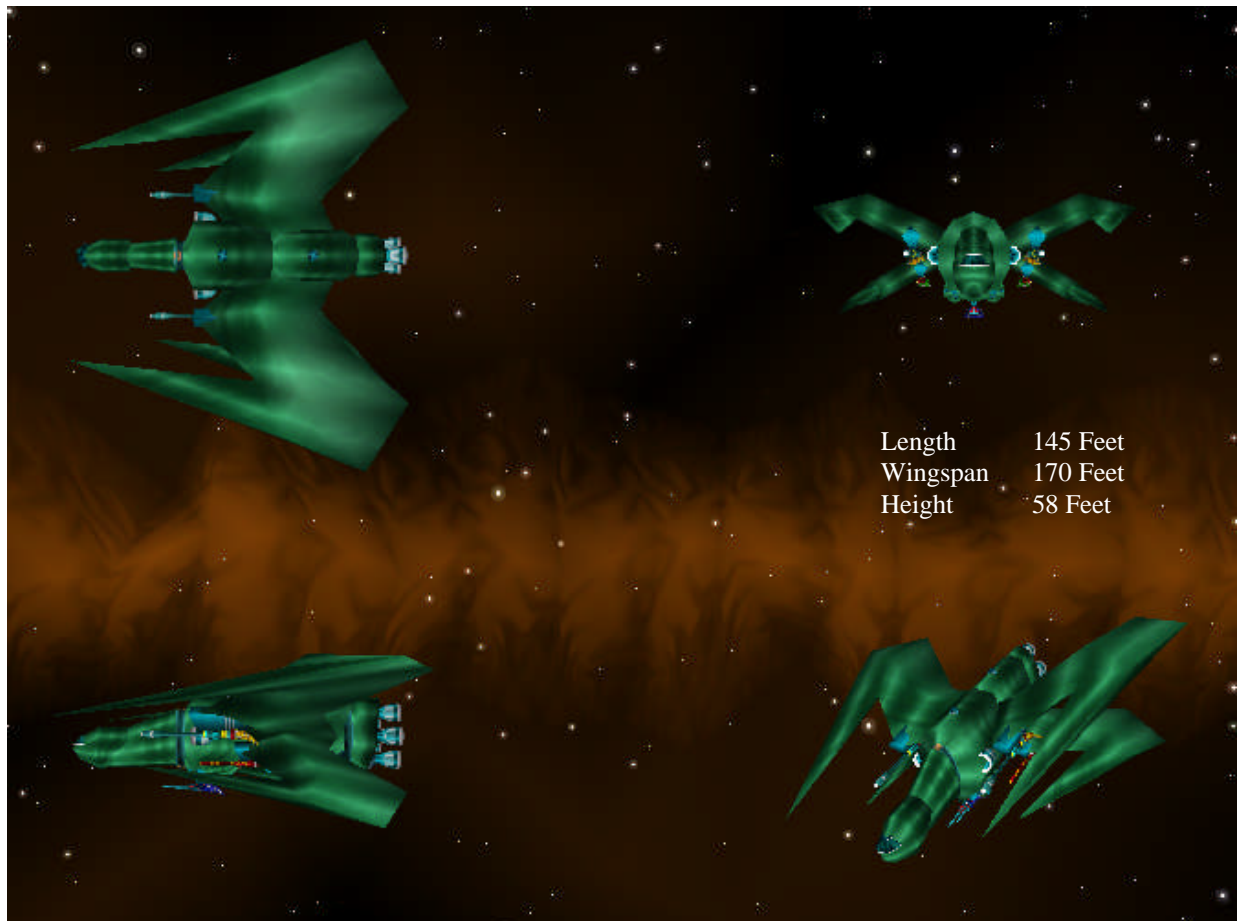


WRAITH SHIP STATISTICS		COMPONENT DAMAGE RATING	
Maximum Velocity	8.2	Engine x 4	90
Acceleration	0.5	Booster x 4	310
Deceleration	0.2	Retro Engine x 2	70
Rate of Turn	120 Degrees/ Second	Engine Cowling	320
Cargo Capacity	37 Tons	Fuselage	3,000
Shield Area	15,100 Square Feet	Neck	650
Shield Units for 100% Strength	1.5	Cockpit	880
		Front Upper Leg x 2	460
Length	34 Feet	Front Lower Leg x 2	720
Width	62 Feet	Front Foot x 2	40
Height	18 Feet	Upper Wing x 2	2,480
		Lower Wing x 2	1,250
No. Class 2 Plasma Mounts	1		
No. Class 2 Gun Mounts	2		
No. Class 3 Gun Mounts	2		
No. Class 2 Missile Launchers	1		

For many years the gull winged Wraith was regarded as the pre-eminent fighting vessel and it's only in recent years that it has been significantly outclassed in this respect by ships like the Hornet. A decent sized cargo bay and a competitive turn of speed have contributed to its longevity and it is still a popular choice with those who wish to carry more than just shield units. Its development history is somewhat murky and rumours abound that it was developed at the behest of the pirate clans. The fact that the manufacturers have not sought to deny these stories only adds to their credence, but some suspect that their ultimate source is the company's marketing department.

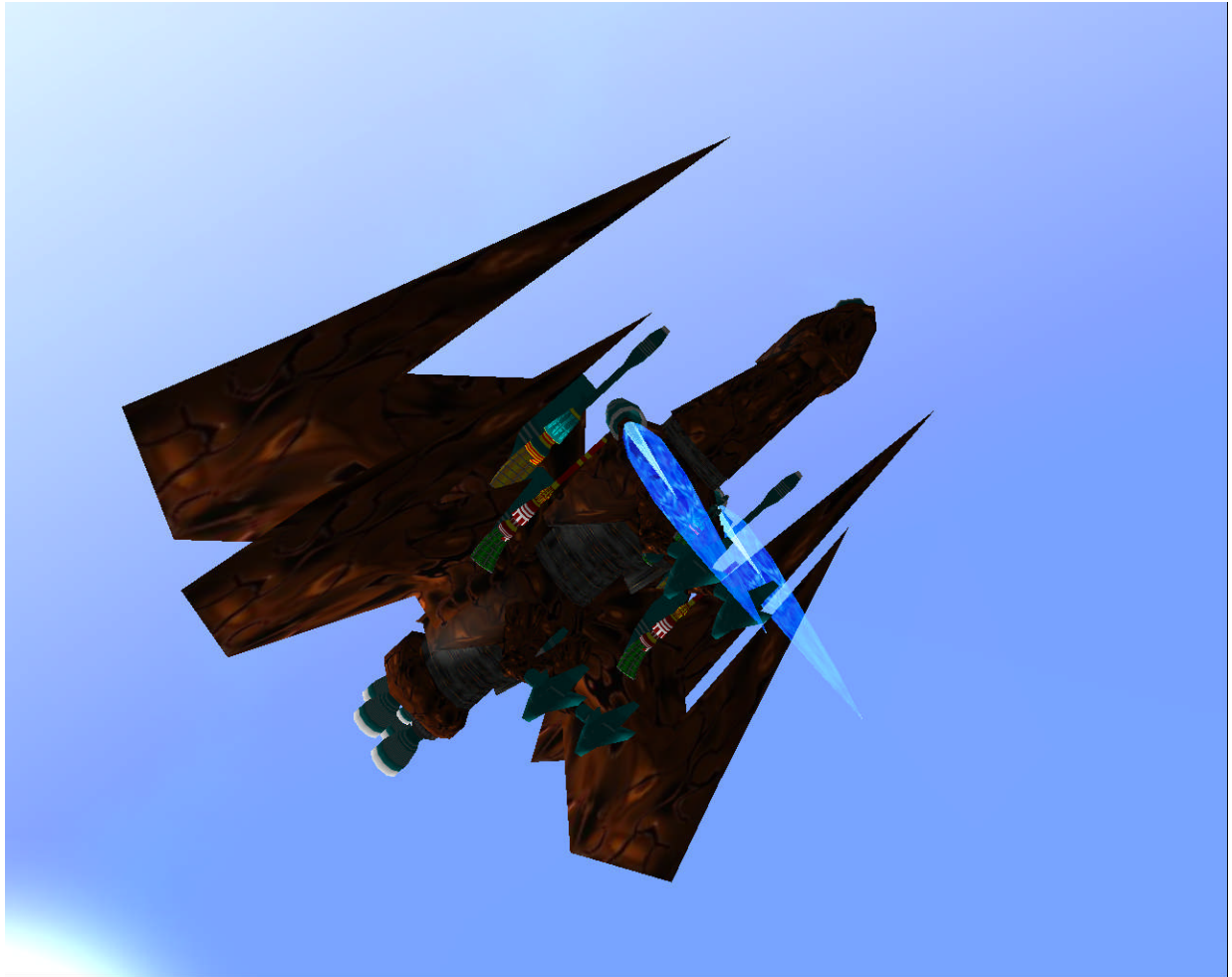


12.13 PHANTASM



PHANTASM SHIP STATISTICS		COMPONENT DAMAGE RATING	
Maximum Velocity	6.3	Engine x 4	1,500
Acceleration	0.4	Booster x 4	4,990
Deceleration	0.2	Retro Engine x 2	1,200
Rate of Turn	90 Degrees/ Second	Engine Cowling	5,260
Cargo Capacity	2927 Tons	Aft Fuselage	22,570
Shield Area	130,000 Square Feet	Fore Fuselage	24,320
Shield Units for 100% Strength	13	Neck	11,300
		Cockpit	8,900
Length	145 Feet	Front Upper Leg x 2	1,840
Width	170 Feet	Front Lower Leg x 2	2,880
Height	58 Feet	Front Foot x 2	180
		Rear Upper Leg x 2	1,840
No. Class 4 Plasma Mounts	1	Rear Lower Leg x 2	2,880
No. Class 7 Gun Mounts	2	Rear Foot x 2	900
No. Class 9 Gun Mounts	2	Upper Wing x 2	15,000
No. Class 3 Turrets	4	Lower Wing x 2	15,000
No. Class 4 Missile Launchers	2		

The Phantasm's brutal looks are in keeping with its violent intent and there are few ships with a more savage appearance than this vessel. Designed as a no compromise hunter-killer its massive engine array and 'stubby' low drag wings give it a decent turn of speed for a ship of this size. It is this aspect coupled with its 'best in class' weapon deployment and small target profile that give it little need of a fighter escort. Often seen prowling the more distant star systems where pirates are in abundance or their prey is at its most vulnerable the Phantasm is highly rated by those on both sides of the law.



12.14 VENOM

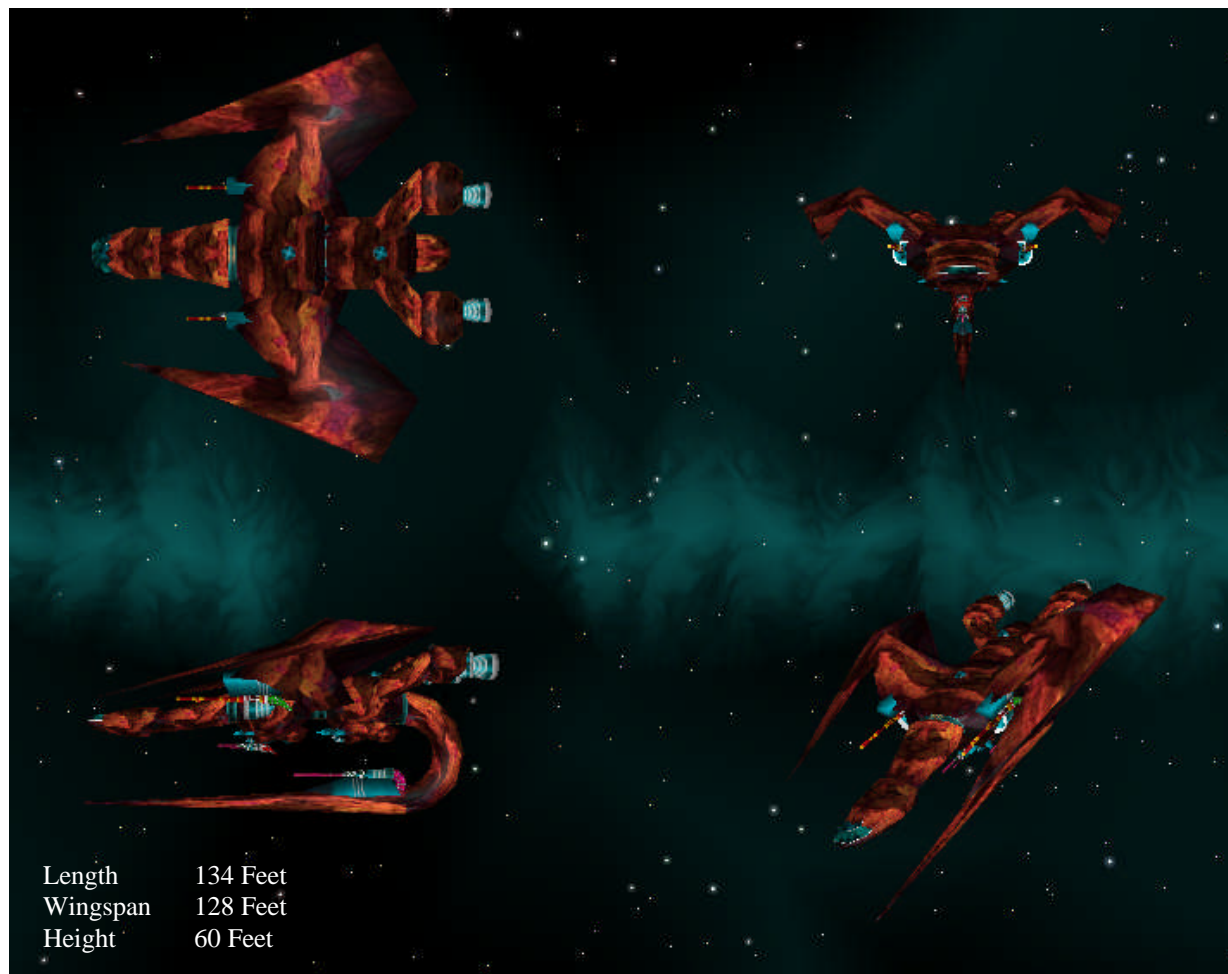


VENOM SHIP STATISTICS		COMPONENT DAMAGE RATING	
Maximum Velocity	7.0	Engine x 5	1,500
Acceleration	0.4	Booster x 2	4,990
Deceleration	0.3	Retro Engine x 2	1,200
Rate of Turn	75 Degrees/ Second	Engine Cowling	3,510
Cargo Capacity	1886 Tons	Aft Fuselage	16,620
Shield Area	75,000 Square Feet	Fore Fuselage	17,940
Shield Units for 100% Strength	8	Neck	3,470
		Cockpit	8,360
Length	135 Feet	Front Upper Leg x 2	2,090
Width	125 Feet	Front Lower Leg x 2	3,260
Height	40 Feet	Front Foot x 2	200
		Rear Upper Leg x 2	2,090
No. Class 3 Plasma Mounts	1	Rear Lower Leg x 2	3,260
No. Class 4 Gun Mounts	2	Rear Foot x 2	1,020
No. Class 7 Gun Mounts	2	Upper Wing x 2	15,000
No. Class 3 Turrets	4	Lower Wing x 2	5,500
No. Class 3 Missile Launchers	2		

Originally intended as a fast assault ship, the Venom has become renowned as the most capable deep space exploration vessel yet designed. Its superior speed, adequate cargo capacity and effective weapon deployment has produced a ship that can be self-sufficient for a prolonged duration in the most remote regions of the galaxy. Although no longer in active service with the military the Venom is still in production by virtue of its popularity with the scientific establishment.

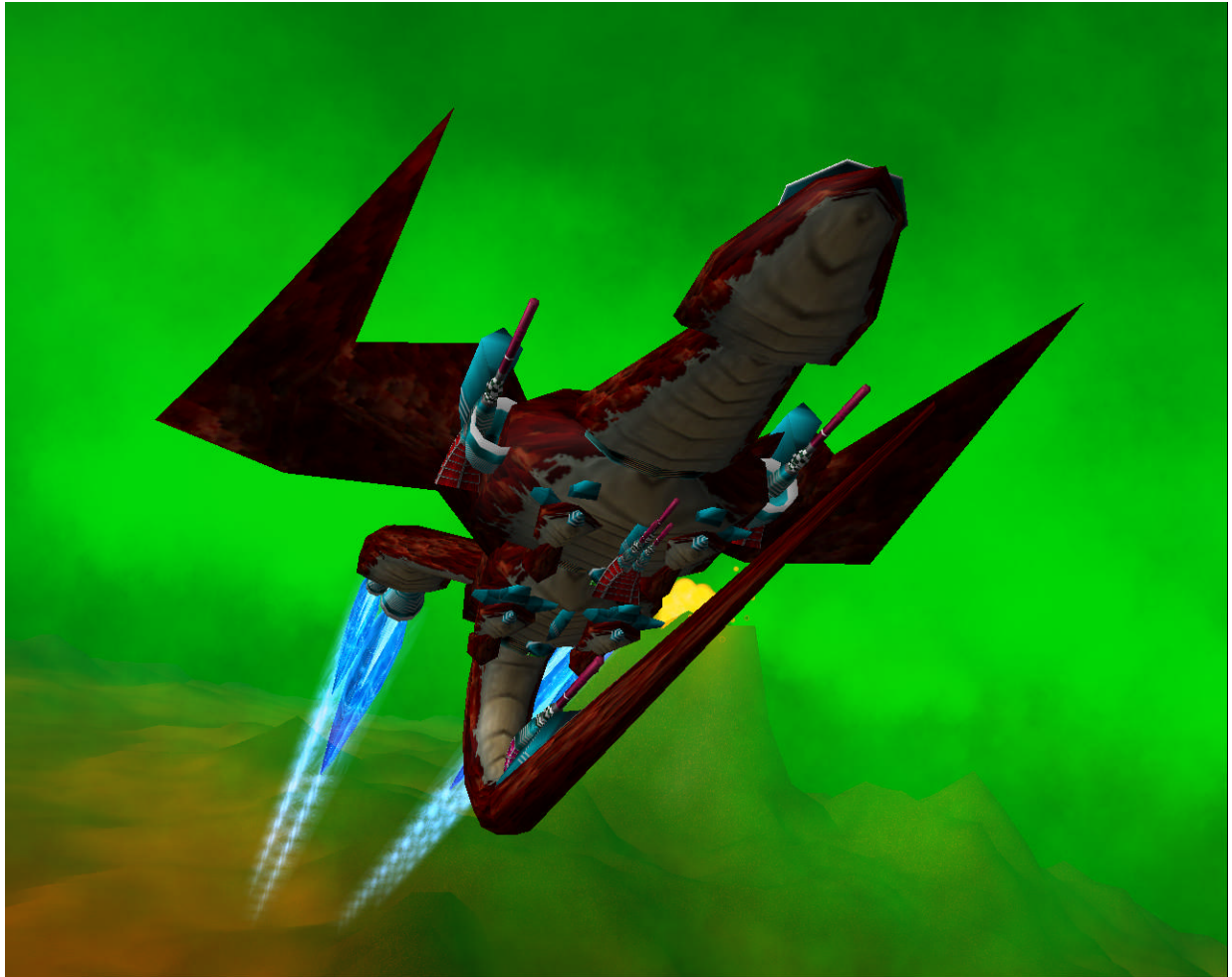


12.15 TYPHON

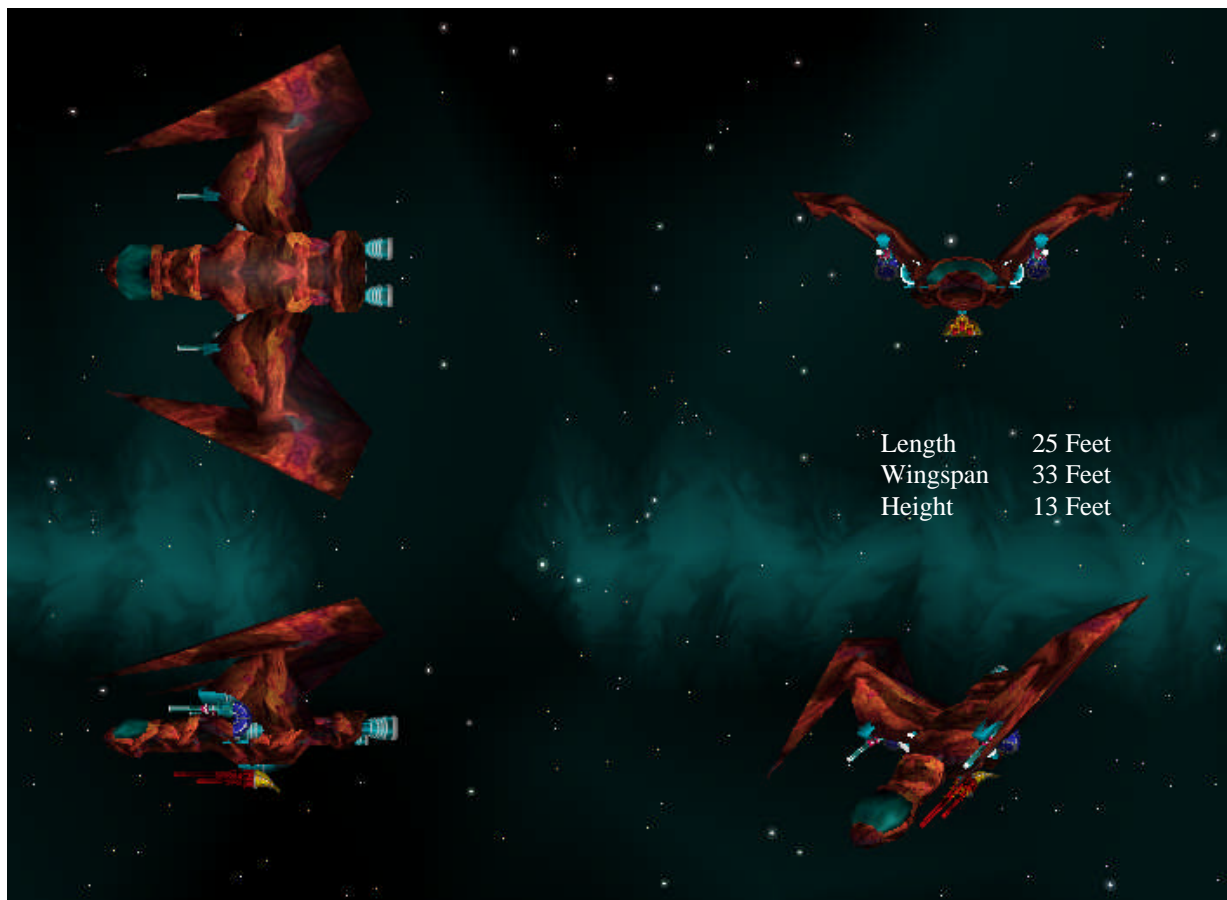


TYPHON SHIP STATISTICS		COMPONENT DAMAGE RATING	
Maximum Velocity	6.6	Engine x 4	1,500
Acceleration	0.4	Booster x 2	4,990
Deceleration	0.1	Retro Engine x 2	1,200
Rate of Turn	90 Degrees/ Second	Engine Cowling	2,480
Cargo Capacity	1735 Tons	Engine Mounting	10,790
Shield Area	69,000 Square Feet	Aft Fuselage	14,070
Shield Units for 100% Strength	7	Fore Fuselage	14,830
		Neck	9,770
Length	134 Feet	Cockpit	9,120
Width	128 Feet	Front Upper Leg x 2	2,480
Height	60 Feet	Front Lower Leg x 2	3,880
		Front Foot x 2	240
No. Class 3 Plasma Mounts	1	Rear Upper Leg x 2	2,480
No. Class 7 Gun Mounts	2	Rear Lower Leg x 2	3,880
No. Class 8 Gun Mounts	1	Rear Foot x 2	1,210
No. Class 3 Turrets	4	Wing x 2	13,480
No. Class 3 Missile Launchers	2	Upper Tail Boom	5,390
		Lower Tail Boom	6,000

The Typhon is a relic of the past and was originally designed as a Deuterium Tanker for transporting fuel from the planet side ocean refineries up to the orbiting space stations. The success of the Taipan led Supermarine to make similar modifications to the Typhon's tail pontoon in order to exploit the military market. At its launch the Typhon was one of the most threatening armed vessels to stalk the space lanes and the Class 8 tail gun could slice through most armour plating as though it didn't exist. Although an old design the Typhon has aged well since its superior speed compensates for its now dated weapon deployment.



12.16 SABRE

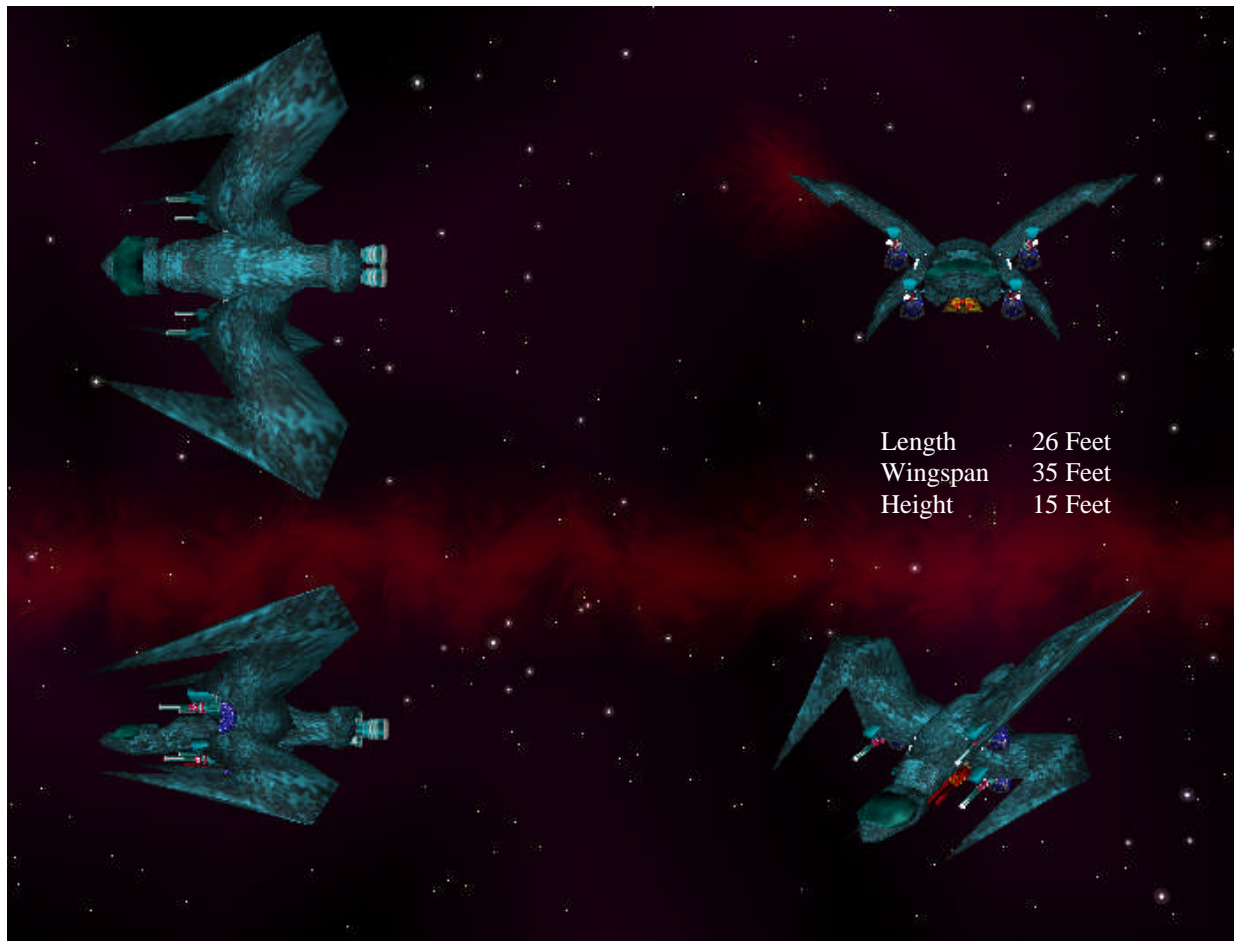


SABRE SHIP STATISTICS		COMPONENT DAMAGE RATING	
Maximum Velocity	9.9	Engine x 5	90
Acceleration	0.8	Booster x 2	310
Deceleration	0.4	Retro Engine x 2	70
Rate of Turn	180 Degrees/ Second	Engine Cowling	210
Cargo Capacity	16 Tons	Fuselage	1,550
Shield Area	4,500 Square Feet	Neck	300
Shield Units for 100% Strength	0.5	Cockpit	410
		Front Upper Leg x 2	130
Length	25 Feet	Front Lower Leg x 2	240
Width	33 Feet	Front Foot x 2	20
Height	13 Feet	Wing x 2	860
No. Class 1 Plasma Mounts	1		
No. Class 2 Gun Mounts	2		
No. Class 1 Missile Launchers	1		

The Sabre is the smallest member of Hawk's popular Sword Class of fighting vessels and is well adapted for a reconnaissance role. Built for speed, the lightly armed Sabre holds many records and in civilian trim is popular with both speed freaks and couriers alike. Its ability to outpace practically any other spacecraft combined with an agility that allows it to evade most missiles means that it is well able to stay out of trouble. Although its weapon systems seem comparatively meagre the rapidity with which it can close with a target can be quite alarming and it's not unusual to encounter this ship used in an offensive manner.



12.17 CUTLASS



CUTLASS SHIP STATISTICS		COMPONENT DAMAGE RATING	
Maximum Velocity	9.0	Engine x 6	90
Acceleration	0.7	Booster x 2	310
Deceleration	0.4	Retro Engine x 2	70
Rate of Turn	150 Degrees/ Second	Engine Cowling	170
Cargo Capacity	13 Tons	Fuselage	2,070
Shield Area	5,000 Square Feet	Neck	150
Shield Units for 100% Strength	0.5	Cockpit	440
		Front Upper Leg x 2	210
Length	26 Feet	Front Lower Leg x 2	210
Width	35 Feet	Front Foot x 2	30
Height	15 Feet	Upper Wing x 2	1,010
		Lower Wing x 2	410
No. Class 1 Plasma Mounts	1		
No. Class 2 Gun Mounts	4		
No. Class 1 Missile Launchers	1		

The Cutlass evolved directly from the Sabre by sacrificing some of its forebear's speed for a significant increase in firepower. Unfortunately the cargo bay was also made to suffer in the interest of maintaining a first class velocity and as a consequence the ship is regarded as possessing inadequate shielding. The military often employ the Cutlass for surprise attacks where the ability to get in and out fast are of primary importance. When utilised in this role the vessel has acquitted itself well, however if it is forced to slug it out then its endurance is often found wanting and its pilots often appear at the top of any casualty lists.

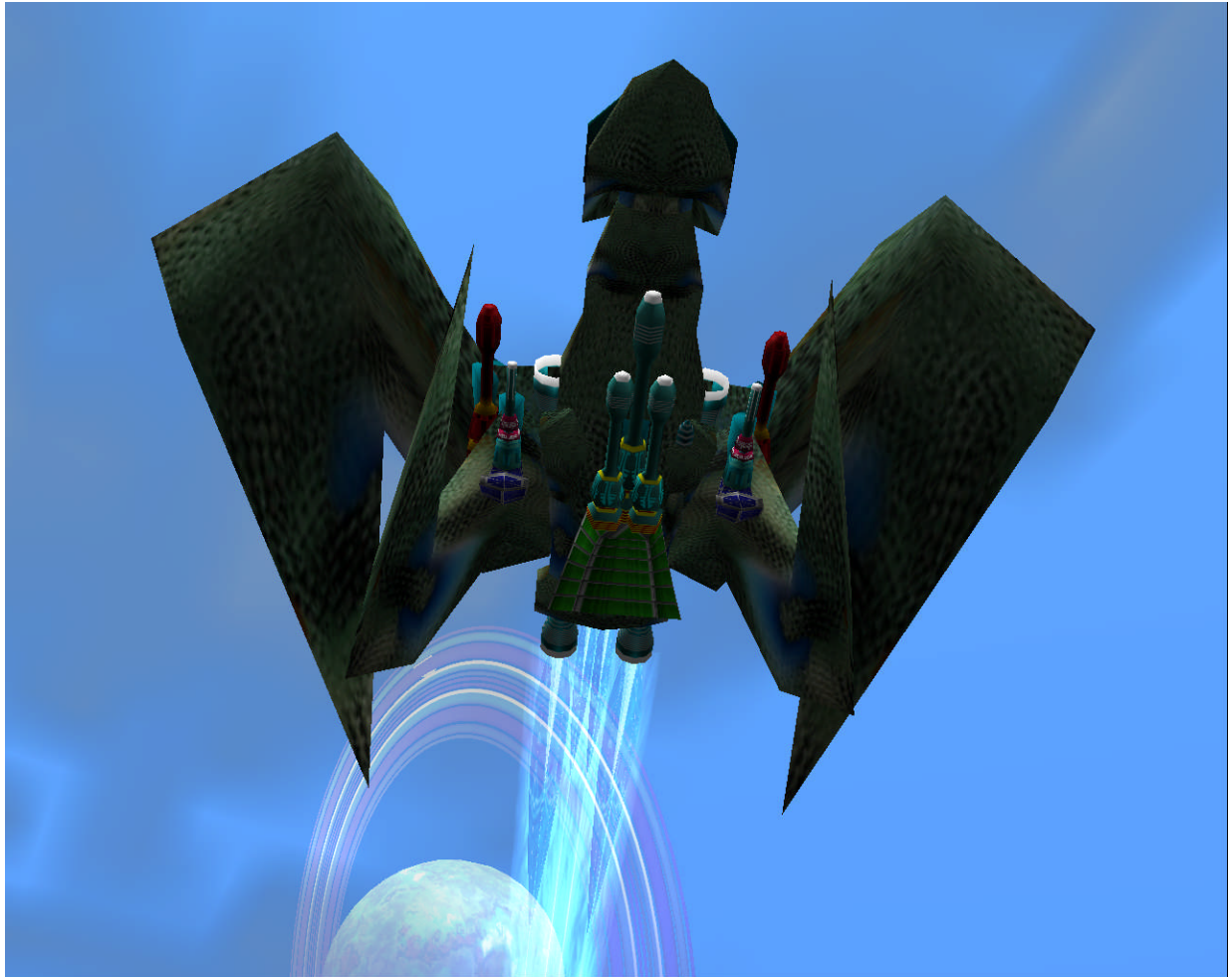


12.18 RAPIER



RAPIER SHIP STATISTICS		COMPONENT DAMAGE RATING	
Maximum Velocity	8.0	Engine x 4	90
Acceleration	0.6	Booster x 3	310
Deceleration	0.3	Retro Engine x 2	70
Rate of Turn	120 Degrees/ Second	Engine Cowling	220
Cargo Capacity	26 Tons	Fuselage	3,170
Shield Area	7,000 Square Feet	Neck	190
Shield Units for 100% Strength	0.7	Cockpit	650
		Front Upper Leg x 2	230
Length	41 Feet	Front Lower Leg x 2	430
Width	43 Feet	Front Foot x 2	40
Height	16 Feet	Upper Wing x 2	2,230
		Lower Wing x 2	600
No. Class 2 Plasma Mounts	1		
No. Class 2 Gun Mounts	2		
No. Class 3 Gun Mounts	2		
No. Class 2 Missile Launchers	1		

The heavy end of Hawkers trio of small fighters, the Rapier addresses some of the limitations that cripple the Cutlass. A cargo bay that is almost double the size of its counterpart addresses the limited shielding and a pair of Class 3 cannons gives it a more potent punch. The Rapier is viewed as a good all rounder; whilst not as quick as the Cutlass it is nothing like as flimsy and consequently it has the staying power to extricate itself from trouble if things get too hot. Although originally commissioned by the military, the Rapier is often seen in civilian guise but when this is the case it is often employed in an anti-social manner.



12.19 BANSHEE



BANSHEE SHIP STATISTICS		COMPONENT DAMAGE RATING	
Maximum Velocity	9.0	Engine x 4	90
Acceleration	0.7	Booster x 4	310
Deceleration	0.3	Retro Engine x 2	70
Rate of Turn	150 Degrees/ Second	Engine Cowling	320
Cargo Capacity	35 Tons	Fuselage	2,820
Shield Area	4,200 Square Feet	Neck	180
Shield Units for 100% Strength	0.5	Cockpit	2,120
		Front Upper Leg x 2	430
Length	34 Feet	Front Lower Leg x 2	670
Width	31 Feet	Front Foot x 2	40
Height	12 Feet	Wing x 2	740
No. Class 2 Plasma Mounts	1		
No. Class 3 Gun Mounts	2		
No. Class 2 Missile Launchers	1		

The Screaming Banshee was commissioned by the military as a fast interceptor with superior Electromagnetic shielding. This was achieved by deploying a cargo bay that was twice the size of any similar class of ship and also by minimising the surface area that it displaced. The result was a vessel that could present a shield overbooking factor without peer making it invulnerable to Laser attacks for a sustained period of time. The Banshee despite a relatively poor weapon deployment is regarded as the pre-eminent ground attack fighter where the ability to evade heavy defences is the most important mission criterion. The vessel is also highly regarded by Special Forces where its ability to deploy or rescue soldiers behind enemy lines is regarded as second to none.



12.20 ALBATROSS



ALBATROSS SHIP STATISTICS		COMPONENT DAMAGE RATING	
Maximum Velocity	5.4	Engine x 5	1,500
Acceleration	0.3	Booster x 2	4,990
Deceleration	0.1	Retro Engine x 2	1,200
Rate of Turn	75 Degrees/ Second	Engine Cowling	3,510
Cargo Capacity	2269 Tons	Aft Fuselage	16,620
Shield Area	155,000 Square Feet	Fore Fuselage	17,940
Shield Units for 100% Strength	16	Neck	14,610
		Cockpit	9,360
Length	145 Feet	Front Upper Leg x 2	2,090
Width	217 Feet	Front Lower Leg x 2	3,260
Height	54 Feet	Front Foot x 2	200
		Rear Upper Leg x 2	2,090
No. Class 3 Plasma Mounts	2	Rear Lower Leg x 2	3,260
No. Class 4 Gun Mounts	2	Rear Foot x 2	1020
No. Class 7 Gun Mounts	2	Upper Wing x 2	15,000
No. Class 3 Turrets	4	Lower Wing x 2	10,340
No. Class 3 Missile Launchers	2		

Designed primarily as a freighter the Albatross has the distinction of being one of only a handful of vessels that allows a second Heavy Cannon to be fitted. By distending the rear fuselage the engineers at Dehaviland have provided enough clearance for an additional weapon to be fired without hitting the one that lies in front of it. Although it is claimed by the manufacturer that this is not at the expense of increased drag, the ships unremarkable top speed appears to contradict the assertion. Despite this the vessel appeals to a broad spectrum of prospective owners, and whether you're a dedicated trader looking for Ship that can fight back or a bounty hunter wishing to dish out heavy damage the Albatross is a spacecraft worthy of consideration.



12.21 RAVEN

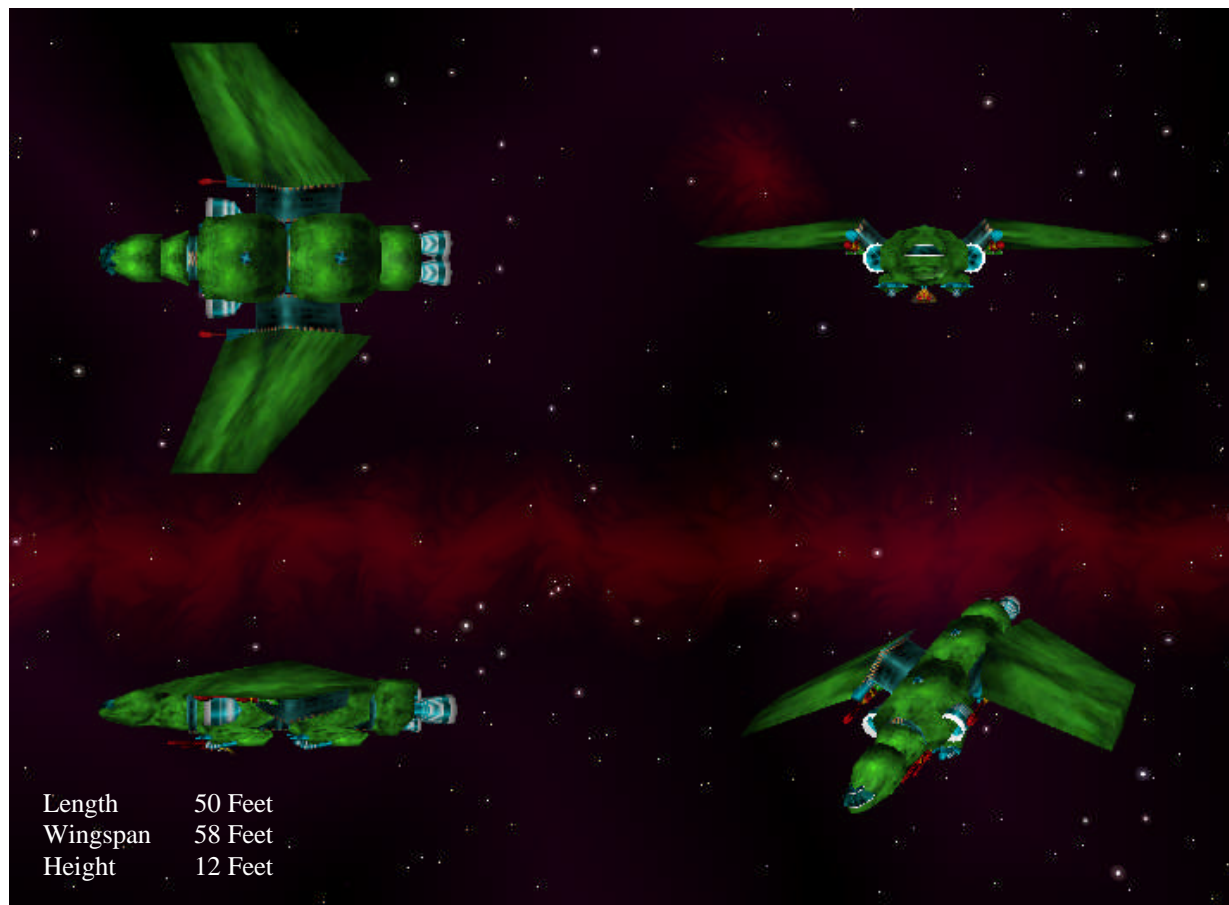


RAVEN SHIP STATISTICS		COMPONENT DAMAGE RATING	
Maximum Velocity	4.7	Engine x 4	1,500
Acceleration	0.3	Booster x 2	4,990
Deceleration	0.1	Retro Engine x 2	1,200
Rate of Turn	75 Degrees/ Second	Engine Cowling x 2	2,480
Cargo Capacity	1678 Tons	Engine Mounting x 2	10,790
Shield Area	158,000 Square Feet	Aft Fuselage	16,380
Shield Units for 100% Strength	16	Fore Fuselage	17,000
		Neck	5,930
Length	152 Feet	Cockpit	11,500
Width	220 Feet	Front Upper Leg x 2	2,090
Height	51 Feet	Front Lower Leg x 2	3,260
		Front Foot x 2	200
No. Class 3 Plasma Mounts	1	Rear Upper Leg x 2	2,090
No. Class 6 Gun Mounts	2	Rear Lower Leg x 2	3,260
No. Class 8 Gun Mounts	3	Rear Foot x 2	1020
No. Class 3 Turrets	4	Upper Wing x 2	15,000
No. Class 3 Missile Launchers	2	Lower Wing x 2	10,940
		Upper Tail Boom	5,390
		Lower Tail Boom	6,000

Originally commissioned by the military as a Capital Ship destroyer, the Raven's design was compromised by the desire for it to support a dual role as an atmospheric troop transport. The subsequent massive wingspan made the vessel unnecessarily vulnerable when fulfilling its primary purpose and the intended lone hunter typically operated with a pack of fighter escorts. Despite this handicap its impressive weapon array has allowed the vessel to perform with distinction in many conflicts and this serves to intensify the disappointment when it is considered how much better the ship could have been if the original specification had been adhered to.



12.22 DRACOLISK



DRACOLISK SHIP STATISTICS		COMPONENT DAMAGE RATING	
Maximum Velocity	7.2	Engine x 6	370
Acceleration	0.4	Booster x 2	1,240
Deceleration	0.2	Retro Engine x 2	300
Rate of Turn	90 Degrees/ Second	Engine Cowling	700
Cargo Capacity	105 Tons	Aft Fuselage	2,560
Shield Area	11,990 Square Feet	Fore Fuselage	2,560
Shield Units for 100% Strength	1.2	Neck	460
		Cockpit	1,200
Length	50 Feet	Front Upper Leg x 2	490
Width	58 Feet	Front Lower Leg x 2	760
Height	12 Feet	Front Foot x 2	40
		Rear Upper Leg x 2	490
No. Class 1 Plasma Mounts	1	Rear Lower Leg x 2	760
No. Class 3 Gun Mounts	2	Rear Foot x 2	240
No. Class 1 Turrets	4	Wing x 2	2,130
No. Class 1 Missile Launchers	2		

Many see the Drakolisk as a ship with an identity crisis since it's hard to determine whether it's a small atmospheric freighter or a large fighter. Unfortunately this jack-of-all-trades is in reality master of none since most small fighters better its forward facing firepower and its puny class 1 turrets lend it a psychological defence rather than an effective one. Whilst a common sight in many systems, the Drakolisk is notorious for the number of previous owners that appear on its logbook and there are few devoted fans of this particular mark.



APPENDIX A : CONTROLS

A1 MAIN CONTROLS

CONTROL KEYS	
ESC	Freeze Game and bring up Options Menu
F1	Enters/ Exits System Map
F2	Enters/ Exits Galactic Map
F3	Enters/ Exits Ship Status
F4	Enters/ Exits Target Ship Status
F5	Enters/ Exits Tactical Screen
F8	Star System Editor (Refer to Appendix L)
F12	SAVE GAME
H	Toggles the Help Menus
SPACE BAR	PAUSE GAME
<	Take Screenshot prior to Windows being drawn. Placed in 'snaps' directory.
>	Take Screenshot after Windows being drawn. Placed in 'snaps' directory.
LEFT-ALT	Show Labels
F6	Enters/ Exits Spacecraft Screen
F9	Enters/ Exits Animal Design Screen
F10	Enters/ Exits Tree Design Screen
F11	Enters/ Exits Texture Design Screen

A2 MAIN SCREEN

CONTROL KEYS	
1 - 5	Fire Missile from Magazine 1 - 5
W	Open Wormhole to selected Star System
A	Engage / Disengage Autopilot
G	Gain Altitude (Autopilot mode)
+	Accelerate
-	Decelerate
SHIFT RIGHT MOUSE BUTTON	Suppresses Mouse as a Ship Control. Allows windows and objects to be selected.
Q or LEFT ARROW	Yaw/ Roll anticlockwise
E or RIGHT ARROW	Yaw/ Roll clockwise
D	Dock with Space Station or Land on Planet Surface/ City Landing Pad
L	Open/ Close Long Range Scanner Window
M	Open/ Close Message Window
C	Open/ Close Contracts Window
U	Undock or Take Off
R	Open/ Close Observation Camera (provided unit has been purchased)
[(open square brackets)	Activate Tractor Beam
] (close square brackets)	De-activate Tractor Beam
S	Target Space Station – (+SHIFT Selects nearest)
V	Target Vessel (i.e. Space Craft) – (+SHIFT Selects nearest)
J	Target Debris (i.e. Junk) – (+SHIFT Selects nearest)
T	Target Asteroid – (+SHIFT Selects nearest)
P	Target Planet – (+SHIFT Selects nearest)
O	Target City on Target Planet – (+SHIFT Selects nearest)

A3 TACTICAL SCREEN

COMMAND CONSOLE : COMMANDS	
RENDEZVOUS	Instructs selected Ships to assemble in Squadron formation
REPAIR	Instructs selected Ships to head for nearest Space Station for repairs.
ATTACK	Instructs selected Ships to attack the current target.
SALVAGE	Instructs selected Ships to salvage the target wreckage.

CONTROL KEYS	
PAGE UP	Zoom In towards Ship
PAGE DOWN	Zoom Out away from Ship
ARROW UP	Rotate Upward about Ship
ARROW DOWN	Rotate Downward about Ship
ARROW LEFT	Rotate Anti-Clockwise about Ship
ARROW RIGHT	Rotate Clockwise about Ship
1 - 5	Fire Missile from Magazine 1 - 5
W	Open Wormhole to selected Star System
A	Engage / Disengage Autopilot
+	Accelerate
-	Decelerate
D	Dock with Space Station or Land on Planet Surface/ City Landing Pad
L	Open/ Close Long Range Scanner Window
M	Open/ Close Message Window
C	Open/ Close Contracts Window
U	Undock or Take Off
R	Open/ Close Observation Camera (provided unit has been purchased)
[(open square brackets)	Activate Tractor Beam
] (close square brackets)	De-activate Tractor Beam
S	Target Space Station – (+SHIFT Selects nearest)
V	Target Vessel (i.e. Space Craft) – (+SHIFT Selects nearest)
J	Target Debris (i.e. Junk) – (+SHIFT Selects nearest)
T	Target Asteroid – (+SHIFT Selects nearest)
P	Target Planet – (+SHIFT Selects nearest)
O	Target City on Target Planet – (+SHIFT Selects nearest)

A4 SYSTEM MAP

CONTROL KEYS	
PAGE UP	Zoom In towards selected Planet
PAGE DOWN	Zoom Out away from selected Planet
ARROW UP	Rotate Upward about selected Planet
ARROW DOWN	Rotate Downward about selected Planet
ARROW LEFT	Rotate Anti-Clockwise about selected Planet
ARROW RIGHT	Rotate Clockwise about selected Planet
RIGHT MOUSE KEY	Re-lock to central Sun and close 'Selected Planetary Body' Window
L	Open/ Close Long Range Scanner
M	Open/ Close Message Window
C	Open/ Close Contracts Window

A5 GALACTIC MAP

CONTROL METHOD 1 : LOCK TO SELECTED SYSTEM	
PAGE UP	Zoom In towards selected Star
PAGE DOWN	Zoom Out away from selected Star
ARROW UP	Rotate Upward about selected Star
ARROW DOWN	Rotate Downward about selected Star
ARROW LEFT	Rotate Anti-Clockwise about selected Star
ARROW RIGHT	Rotate Clockwise about selected Star
RIGHT MOUSE KEY	Re-lock to current Star System

CONTROL METHOD 2 : UNLOCKED	
PAGE UP	Move Forwards
PAGE DOWN	Move Backwards
ARROW UP	Rotate Upward
ARROW DOWN	Rotate Downward
ARROW LEFT	Rotate Left
ARROW RIGHT	Rotate Right

GENERAL CONTROL KEYS	
SHIFT	Slow Movement
LEFT-ALT	Show Labels
RIGHT MOUSE KEY	Close 'Selected Star' Window
W	Open Wormhole to selected Star System
L	Open/ Close Long Range Scanner
M	Open/ Close Message Window
C	Open/ Close Contracts Window

APPENDIX B : ASTRONOMY

Ad Astra utilises a Stella database compiled by the author from the 1997 Hipparcos Star Catalogue.

Whilst the position and types of stars plotted in the Galactic map and displayed through the main screen are entirely accurate, it should be noted that the planetary systems themselves have no scientific basis whatsoever.

B1 STAR CLASSIFICATION

Stars are classified in terms of their size and spectra using a letter and a number followed by a Roman numeral. The letter represents the spectra (i.e. Colour), the number is referred to as the subtype and the Roman numeral indicates the star's size. The subtype is effectively a qualifier attached to the Spectra such that the higher the value the cooler the temperature within its band. The following tables describe the meaning of each of these terms.

SPECTRA		
W	Blue	Up to 80,000 K
O	Blue	40,000 – 35,000 K
B	Blue-White	25,000 – 12,000 K
A	White	10,000 – 8,000 K
F	Green	7,500 – 6,000 K
G	Yellow	6,000 – 4,800 K
K	Orange	4,800 – 3,100 K
M	Red	3,400 – 2,000 K
C	Red	3,400 – 2,000K Carbon Star
R and S	Red	2,600K Carbon Star
N	Red	2,500K Carbon Star
L and T	Red	< 2,000 K Brown Dwarfs

SIZE	
I	Super Giant
II	Giant
III	Giant
IV	Sub-Giant
V	Dwarf
VI	Sub-Dwarf

As an example our sun is a G2V star. The spectral value of 'G' indicates that it is yellow and the subtype of 2 means that it lies towards the high end of its temperature gradient. The Roman numeral 'V' means that the star is a dwarf.

B2 STAR NAMING CONVENTIONS

Unfortunately there is no single definitive star naming convention and any one star may have many different names depending upon when it was discovered, how bright it is or in which catalogue it appears in. The following table describes the most common forms of terminology.

NAMING CONVENTION	DESCRIPTION
COMMON NAME	Many of the brightest stars possess a common name which is generally of Arabic origin. Examples are Sirius, Capella and Rigel.
BAYER CODE	A German amateur astronomer called Johann Bayer devised the Bayer coding system. His scheme uses a Greek Letter followed by the name of the constellation that it appears in, such that the letter designates the brightness of the star relative its parent constellation. Thus Alpha Centauri is the brightest star in the constellation of the Centaur.
FLAMSTEED NUMBER	John Flamsteed, the first Astronomer Royal, gave numbers to the stars so they were enumerated from west to east without regard to the star's brightness. As an example, Sirius, in Canis Major has a Flamsteed code of 19 Canis Majoris. Flamsteed numbers are often combined with Bayer codes as a Bayer-Flamsteed designation. For example 19 Beta Orionis.
HD NUMBER	Designation of the Star that appears in the Henry Draper Catalogue
HR NUMBER	Designation of the Star that appears in the Yale Bright Star Catalogue
GLIESE CODE	Designation of the Star that appears in the Gliese Catalogue
HIPPARCOS NUMBER	Designation of the Star that appears in the Hipparcos Catalogue
DURCHMUSTERUNG NUMBER	The Durchmusterung number can correspond to a Bonner (BD), Cordoba (CD) or Cape Photographic (CPD) number. The number has the following format : +/- ZZ NNNNN +/- ZZ corresponds to the Declination Zone NNNNN corresponds to the running number

APPENDIX C : PLAYING TIPS

The following tips are intended to help the novice player familiarise themselves with the game and to generally stay alive.

1. Use the Space Key to pause the game when things get 'hot'. The long range scanners, tactical screen and status screens can all be freely accessed in order to formulate a suitable combat strategy.
2. Don't horde missiles, they're relatively cheap and very effective. Also be aware of the type of missile that will be fired next from the magazine – if in doubt pause the game and check via the status screen.
3. Buy Enhanced Short Range Scanners at the earliest opportunity.
4. Be aware of your enemy's strengths and weaknesses. In particular if the hostile spacecraft possesses multiple engine arrays then the quickest way to disable it is a missile barrage from the front on its cockpit.
5. To earn a decent profit through trade requires a super freighter. If you own a smaller ship then bounty hunting, deep space salvage or piracy are the quickest ways of becoming rich.
6. If you're targeted by a missile then head for the nearest super freighter – with any luck it will hit this before it hits you.
7. Space Stations and City Landing Pads are safe havens. If you're outgunned dock at the earliest opportunity.
8. Save the game regularly via the F12 key – it's quick and not particularly intrusive. Remember to clean up the save directory and recycle bin on a regular basis though.
9. The recommended control method is via the mouse. It is also worth stressing that whilst the 'fly to pointer' option is probably the most intuitive method, the default 'Pitch+Roll' provides more freedom of control and is worth persevering with. If the 'fly to pointer' method is adopted then the mouse sensitivity will probably need to be raised.
10. If you're new to the game then unprovoked attacks can be inhibited by selecting the 'passive aliens/pirates' in the preferences menu. It may also be a good idea to jump to a new system as this will cause current attackers to be disengaged.

APPENDIX D : SYSTEM REQUIREMENTS & PERFORMANCE TIPS

Minimum System Requirements

256MB RAM
100MB Hard Disk Space
AMD1900+ Processor or Intel equivalent
ATI 9600 64MB Graphics card or equivalent.
DirectX7

Ideal System Requirements

512MB RAM
100MB Hard Disk Space
UNKNOWN AT PRESENT
ATI X700 128MB or NVidia 6600 128MB Graphics card
DirectX7

Ensure that there is enough RAM

Ad Astra should be able to run on a PC with 256MB of RAM. However this is extremely tight and consequently all other applications must be shut down.

To check that there is enough RAM enter the diagnostics screen as described in Section 2.7 and check that the 'Available Memory' is well above 0 (ideally the order of a few MB). If this value is low then the PC will start swapping onto its hard drive and you'll probably hear this device rattling.

Ensure that the game isn't constantly interrupted by background processes on your PC

If when you enter the 'user options' via the 'ESC' key the Frames Per Second counts constantly fluctuates then this is a sure sign that some other process on your PC is stealing CPU cycles from the game. Check the Task List using 'Ctrl-Alt-Delete' for any processes that are actively using CPU cycles and determine whether you can stop them. Also if you're connected to the Internet then disconnect from it as this can be surprisingly intrusive.

APPENDIX E : SPACECRAFT DESIGN

E1 : MAIN OPTIONS

The Spacecraft Design screen can be accessed via the 'F6' Key. The screen will present a randomly generated spacecraft together with a number of iconised windows.

The 'Main Options' window is shown in Figure E1 and table that follows it describes the Key fields.

MAIN OPTIONS

SHIP NAME

Small Fighter
Small Tailed Fighter
Large Single Fuselage Freighter
Large Atmospheric Freighter
Battleship
Large Tailed Atmospheric Freighter
Train
Large Triple Fuselage Freighter
Small Fighter+2 Wing Engines
Small Fighter+4 Wing Engines

GENERATE
REGENERATE
SAVE
LOAD

Z OFFSET
-5.000000

Texture Map
0

ENGINE TYPE
0

STYLE
0

Animate Rotors ☒

MAX VELOCITY
9.900000

MAX ACCELERATION
0.800000

MAX ANGLE ROTATION
60

MAX DECELERATION
0.400000

No Polygons 19

Engine	->	8548	0000
Thrust Normal	->	8108	0390
Engine (Booster)	->	8548	0000
Engine Cowling	->	8428	0000
Fuselage	->	8381	0000
Engine (Retro)	->	8248	0000
Thrust Retro	->	8108	0390
Neck	->	8428	0000
Cockpit	->	8444	0000
Front Upper Leg	->	8072	0000
Front Upper Leg	->	8072	0000
Front Lower Leg	->	8108	0000
Front Lower Leg	->	8108	0000
Front Foot	->	8084	0000
Front Foot	->	8084	0000
Top Wing	->	8126	0000
Top Wing	->	8126	0000

Figure E1

The Text at the bottom of the window indicates how many polygons the Ship requires and the respective size in terms of vertices for each.

FIELD	DESCRIPTION
SHIP NAME	Name of the Ship to be loaded or saved.
SCROLLING LIST	List of basic ship formats
GENERATE	Generates a new design based on the selected format.
REGENERATE	Regenerates the Ship after any adjustments have been made. The 'RETURN' key will also perform this function.
SAVE	Saves the current design. The file name will be based on the 'Ship name' and stored in the 'ship_temps' directory.
LOAD	Loads the required ship design. Only the ship name needs to be entered and not the encoded file name held in the 'ship_temps' directory.
Z OFFSET	Used to centre the ship. The yellow number in the top left-hand corner of the screen represents the size of the ship. When this value is at its smallest the Z offset will be at the centre of the ship.
TEXTURE MAP	Selects a Texture Map (has limited use)
ENGINE TYPE	Selects an Engine format (Ignore this field - use the 'Generate button instead to throw up a suitable engine cluster).
ANIMATE ROTORS	Animates any rotors or flapping wings that the spacecraft may possess.
STYLE	Governs style of engines and generic colours.
MAX VELOCITY	Max Velocity of Spacecraft
MAX ACCELERATION	Max Acceleration of Spacecraft
MAX DECELERATION	Max Deceleration of Spacecraft
MAX ANGLE	Max Angle of rotation of Spacecraft.

E2 : CYLINDER CONFIGURATION

The Fuselage, Cockpit, Bridge, Legs, Neck and Tail of the spacecraft are all built from cylinders and the respective design window is shown in Figure E2.

Each of the Ships main components possesses such a window and once adjustments have been made the 'RETURN' key should be pressed to cause them to be adopted.

The 'Top' of the cylinder faces towards the front of the Spacecraft, whereas the bottom faces towards the rear.

BODY

SUPPRESS DISTORTION TOP ☐ BOTTOM ☐

DISTORTION TYPE

ITERATIONS

CYLINDER TYPE

WIDTH TOP MID BOTTOM

HEIGHT TOP MIDDLE BOTTOM

LENGTH LENGTH TOP LENGTH BOTTOM LENGTH

DEPTH TOP MIDDLE BOTTOM

SKEN X SKEN Y SKEN

X ANGLE Y ANGLE Z ANGLE

BEND X ANGLE AC ☐

BEND Y ANGLE AC ☐

X RADIUS Y RADIUS

Figure E2

FIELD	DESCRIPTION
SUPPRESS DISTORTION	Clicking the 'Top' or 'Bottom' toggle buttons will cause the distortion at the top or bottom of the cylinder to be suppressed.
ITERATIONS	Number of radial vertices used to describe the cylinder - best to leave at default value.
DISTORTION TYPE	Type of distortion to be applied to cylinder. The following are supported: 0 - Width Distortion only - typically used for fuselages 1 - Width and Length Distortion - typically used for cockpits 2 - Taper Distortion - typically used for tails (e.g. on Taipan) 3 - Taper with Width and Length Distortion
CYLINDER TYPE	Selects a Cylinder template
WIDTH	Controls the Width of the Cylinder
HEIGHT	Controls the Height of the Cylinder
DEPTH	Controls the Depth of the Cylinder
LENGTH	Controls the Length of the Cylinder. The Top and bottom lengths are used in conjunction with the distortion type of '1'.
SKEW	Skews the cylinder horizontally or vertically. Neck cylinders are typically skewed.
BEND ANGLE	Angle to Bend Cylinder - Taipan Tail uses this distortion
AC BUTTON	Bend Anti-clockwise
RADIUS	Radius of Bend

E3 : WING CONFIGURATION

The Wings and Fins are built from custom designed structures and Figure E3 illustrates the design screen. Each of the spacecrafts wing pairings will possess a respective window and once adjustments have been made the 'RETURN' key should be pressed to cause them to be adopted. Each wing has the concept of a middle and a tip and thus can be bent along these axis's. The location of the Engine and Weapon mounting points, together with the middle and tip vertices are currently hard coded within the game. This means that editing the 'wing' files held in the 'objects' directory could cause odd results. However this will be modified at a future date to allow superior custom designs to be realised.

TOP WING

WING TYPE
1

WING ANGLE
24

Pre Rotate ☒ Post Rotate ☒

SPAN
9.881881

WIDTH
6.388888

Z OFFSET
0.888888

HEIGHT
MIDDLE
-1.675888
TIP
0.588888

Projection

NO. PROJECTION	PROJECTION TYPE	NO. PROJECTION	PROJECTION TYPE
0	0	0	0
PROJECTION ANGLE		PROJECTION ANGLE	
0		0	
PROJECTION TEXTURE		PROJECTION TEXTURE	
0		0	
SPAN	1.888888	SPAN	1.888888
WIDTH	1.888888	WIDTH	1.888888
X OFFSET	0.888888	X OFFSET	0.888888
Y OFFSET	0.888888	Y OFFSET	0.888888
Z OFFSET	0.888888	Z OFFSET	0.888888
HEIGHT	MIDDLE 0.888888 TIP 0.888888	HEIGHT	MIDDLE 0.888888 TIP 0.888888

Figure E3

FIELD	DESCRIPTION
WING TYPE	Indicates the wing format to be used. The structure of the Wing is held in a file within the 'objects' directory. For instance Wing Type 1 would use 'ship_wing1.txt'.
WING ANGLE	Angle of the Wing.
PRE/ POST ROTATE	Indicates whether the Wing should be rotated before or after any distortions have been made.
SPAN	Span of Wings
WIDTH	Width of Wings
Z OFFSET	Position of Wings with respect to the rest of the Spacecraft
HEIGHT	Raises or Lowers the Middle and Tip areas of the Wing.
PROJECTION	Refer to the Projections Section

E4 : PROJECTION CONFIGURATION

Appended to the Wing and Cylinder design windows can be found a projection configuration area which can be used to add fins and canards to the Spacecraft. Referring to Figure E4 it can be seen that the area is divided into two regions each of which can be used to configure a pair of projections.



Figure E4

FIELD	DESCRIPTION
NO. PROJECTIONS	Number of Projections to be added - i.e. 0, 1 or 2.
PROJECTION ANGLE	Angle of the projections
PROJECTION TEXTURE	Texture of the projection
SPAN	Span of Projection
WIDTH	Width of Projection
X OFFSET	Position of Projection with respect to the parent object.
Y OFFSET	Position of Projection with respect to the parent object.
Z OFFSET	Position of Projection with respect to the parent object.
HEIGHT	Raises or Lowers the Middle and Tip areas of the Projection.

E5 : CANOPY CONFIGURATION

Appended to the Cabin (Cockpit) design window can be found a canopy configuration area which can be used to add a bridge or cockpit screen to the spacecraft.

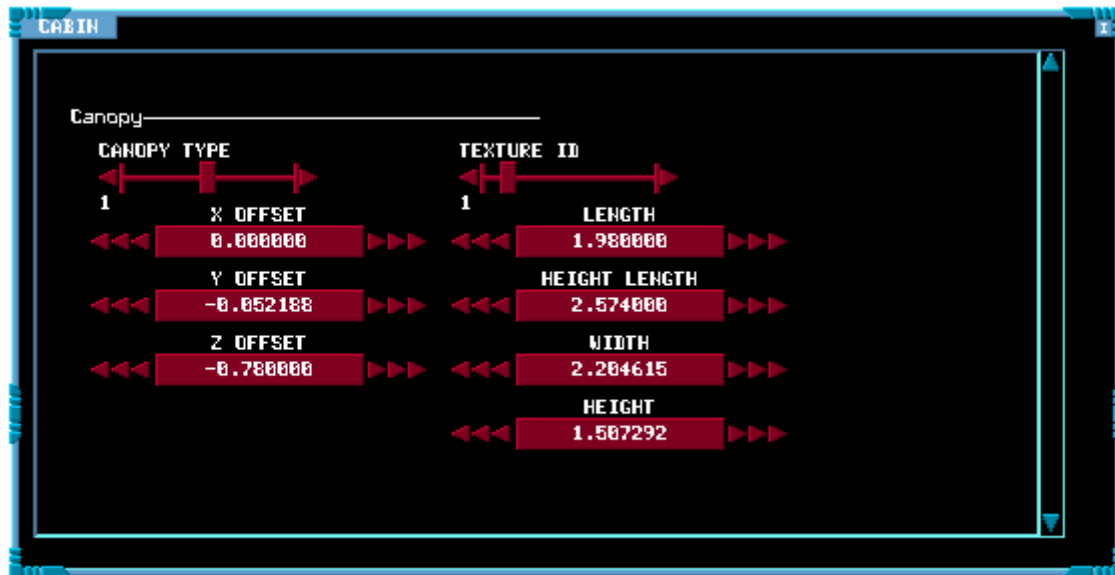


Figure E5

FIELD	DESCRIPTION
CANOPY TYPE	Type of Canopy. Currently either a Bridge structure or a Cockpit screen.
TEXTURE ID	Type of Texture to be used.
X OFFSET	Position of Canopy with respect to the parent object.
Y OFFSET	Position of Canopy with respect to the parent object.
Z OFFSET	Position of Canopy with respect to the parent object.
LENGTH	General Length of Canopy
HEIGHT LENGTH	Length of the Highest point of the Canopy
WIDTH	Width of the Canopy
HEIGHT	Height of the Canopy

E6 : FOOT CONFIGURATION

Appended to the Lower Leg design window can be found a foot configuration area.

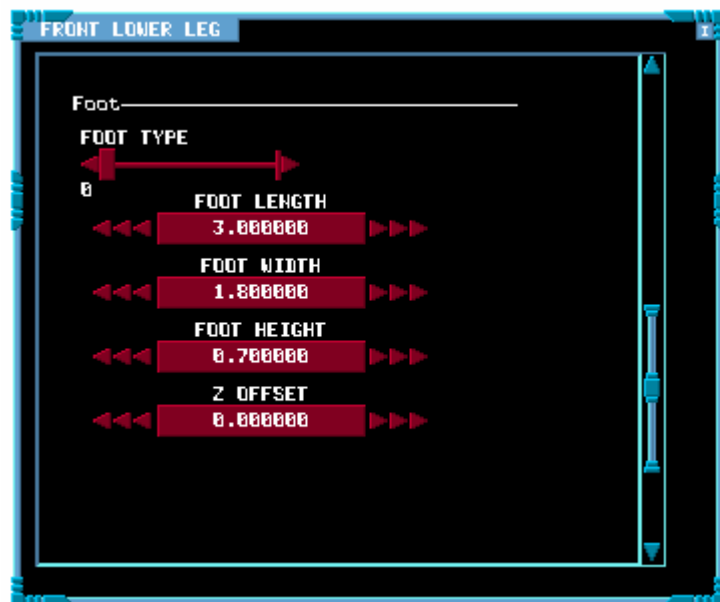


Figure E6

FIELD	DESCRIPTION
FOOT TYPE	Type of Foot.
FOOT LENGTH	Length of Foot
FOOT WIDTH	Width of Foot
FOOT HEIGHT	Height of Foot
Z OFFSET	Position of Foot with respect to the parent object.

E7 : SPACECRAFT TEXTURES

The Spacecraft use two distinct texture maps. The first is a generic bitmap held in the 'textures' directory named 'ship_part.bmp'. This contains the bitmap that is used to describe the Engines. The 'Style' slider described in the Main Options window determines which texture that should be applied.

The other texture is contained in the 'textures/ships' directory and the format is illustrated in Figure E7.

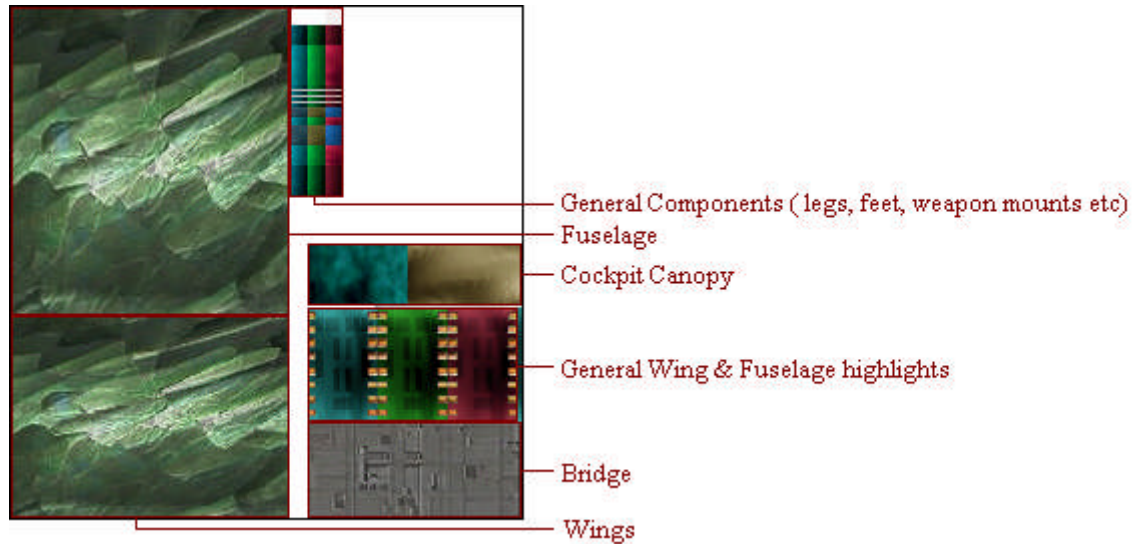


Figure E7

This corresponds the main texture of the ship and different versions are selected at random on entry to a particular star system. The 'Style' slider contained in the Main Options window will also govern which of the General Component and Wing/ Fuselage highlights to use.

APPENDIX F : TREE DESIGN

The Tree design screen can be entered via the F10 Key and is illustrated in Figure F1. The top slider determines the type of tree to be created and repeated pressing of the F10 key will cause a new species to be generated.

High, Medium, Low and Tiny resolution versions of each tree species are constructed and the radio buttons allow each of these to be displayed.

The text area in the middle of the window displays information relating to each of the tree designs.

The bottom part of the window allows the user to change the orientation of the tree.

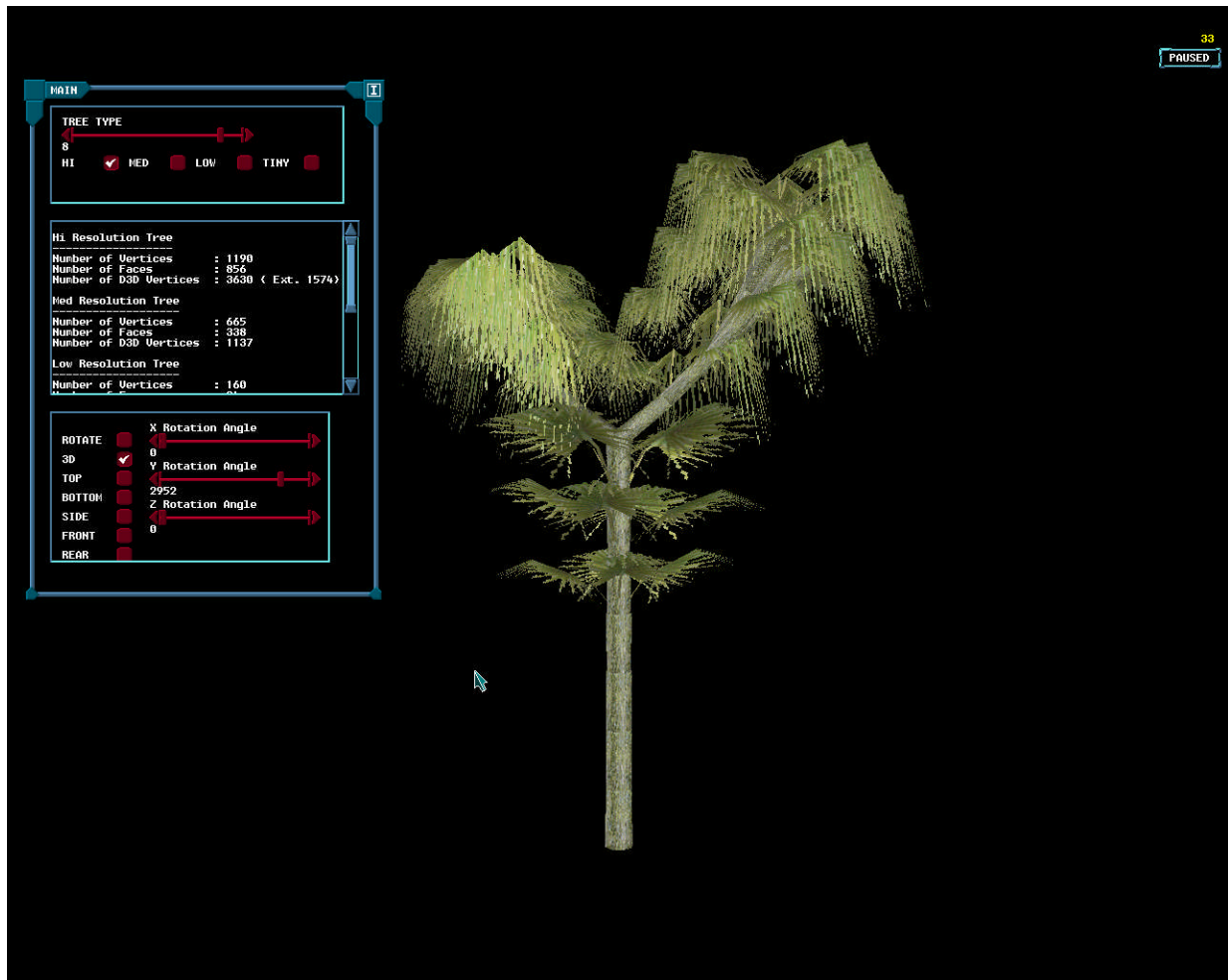


Figure F1

The following types of tree are currently supported:

- Type 0 : Random branch structure spreading from a small trunk
- Type 1 : Symmetrical branch structure spreading from a small trunk
- Type 2 : Tall straight trunk with random branch structure
- Type 3 : Tall straight trunk with symmetrical branch structure
- Type 4 : Tall bending trunk with random branch structure
- Type 5 : Tall bending trunk with symmetrical branch structure
- Type 6 : Tall with branches tapering to the top
- Type 7 : Tall with branches tapering to the bottom
- Type 8 : Tall with small branches spreading into a random crown
- Type 9 : Tall with small branches spreading into a symmetrical crown.

The texture map (tree.bmp) used to describe the bark and leaves of the tree can be found in the textures directory.

The polygon files used to describe the leaves can be found in the objects directory and Figure F2 indicates which texture corresponds to each of these files. There are three versions of each file that correspond to high, medium and low resolution models of the tree.

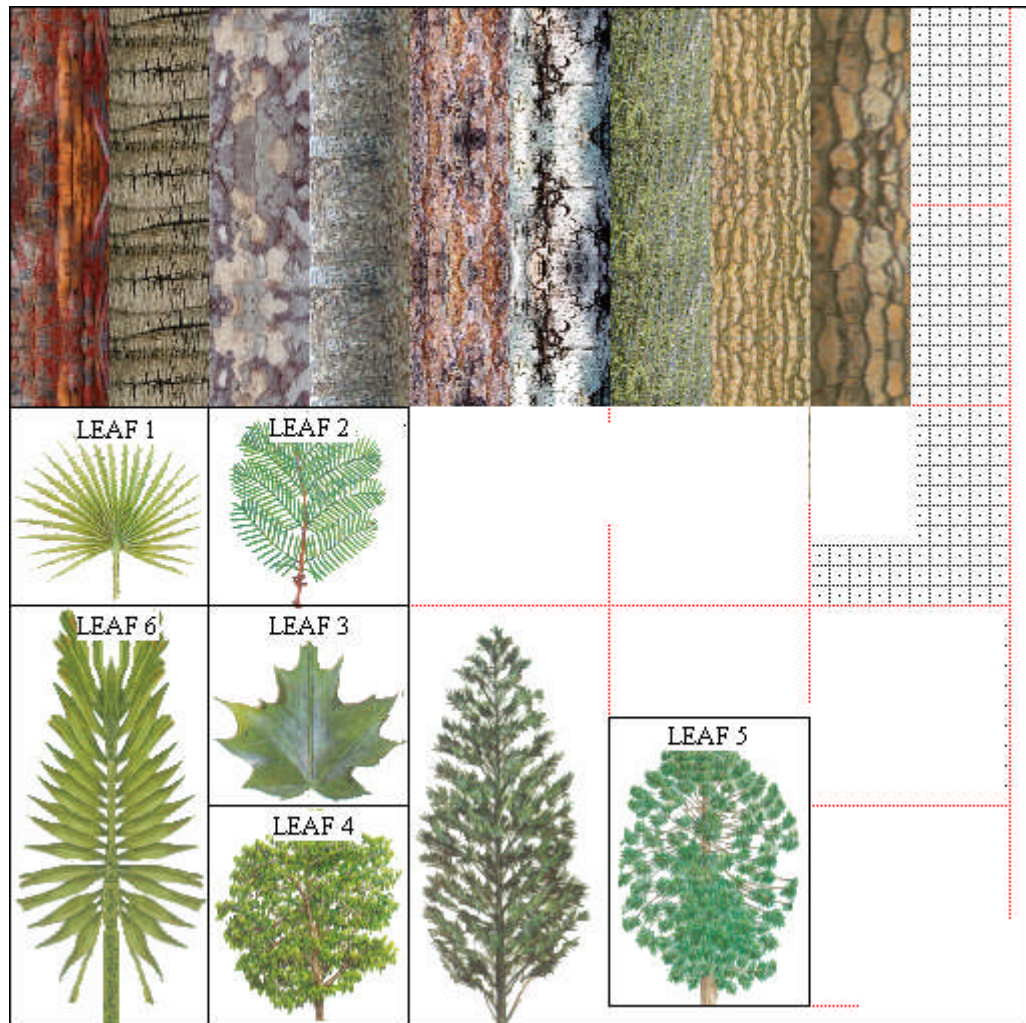


Figure F2

APPENDIX G : ANIMAL DESIGN

Figure G1 illustrates the Animal design screen, which can be entered via the F9 Key. The window at the top of the screen allows the animal to be orientated, the type to be selected and an animation sequence to be activated. The bottom window is used to build an animation file and in the demo version of the game this has been deactivated for the most part. However the 'run sequence' button and the 'animation sequence' slider can still be used.



Figure G1

The following types of animal are currently supported:

- Type 0 : Bipedal Reptilian (i.e. Theropod Dinosaur)
- Type 1 : Quadruped with long thick tail (i.e. Sauropods, Stegosaurus etc.)
- Type 2 : Quadruped with short tail
- Type 3 : Insects
- Type 4 : Avian with long thick tail (i.e. Dragons)
- Type 5 : Avian with feathered or bat like tails

The texture maps used by the animal models can be found in the 'textures/animals' directory. Each bitmap is used to describe two animals as shown in Figure G2.

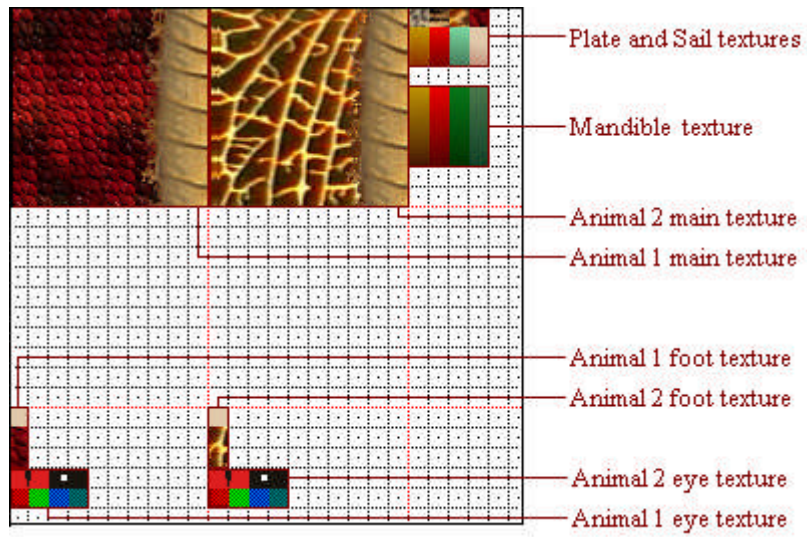


Figure G2

APPENDIX H : GALACTIC DATABASE

The Galactic DB was constructed from the 1997 Hipparcos Catalogue. The Bayer Flamsteed codes and common names were added by cross-referencing the Hipparcos or Henry Draper number with the HD-DM-GC-HR-HIP-Bayer-Flamsteed Cross Index.

The entries in the catalogue that did not possess a Parallax, Spectra or Magnitude were ignored.

The format of the fields within the file is described in the following table.

FIELD	FORMAT DESCRIPTION										
HIPPARCOS NUMBER	Decimal Number										
HENRY DRAPER NUMBER	Hexadecimal Number - A value of 0xFFFFFFFF indicates that a HD Number does not exist.										
	32 bit Hexadecimal Number coded as follows: <table border="1"> <thead> <tr> <th>BIT</th><th>Meaning</th></tr> </thead> <tbody> <tr> <td>32</td><td>0 - Positive declination zone 1 - Negative declination zone</td></tr> <tr> <td>31-30</td><td>0 - Bonner DM Number 1 - Cape Photographic DM Number 2 - Cordoba DM Number</td></tr> <tr> <td>17-24</td><td>Declination Zone</td></tr> <tr> <td>1-16</td><td>Running Number</td></tr> </tbody> </table> <p>A value of 0xFFFFFFFF indicates that a DM Number does not exist.</p>	BIT	Meaning	32	0 - Positive declination zone 1 - Negative declination zone	31-30	0 - Bonner DM Number 1 - Cape Photographic DM Number 2 - Cordoba DM Number	17-24	Declination Zone	1-16	Running Number
BIT	Meaning										
32	0 - Positive declination zone 1 - Negative declination zone										
31-30	0 - Bonner DM Number 1 - Cape Photographic DM Number 2 - Cordoba DM Number										
17-24	Declination Zone										
1-16	Running Number										
BAYER-FLAMSTEED CODE	Four 16 bit Hexadecimal numbers <table border="1"> <thead> <tr> <th>Number</th><th>Meaning</th></tr> </thead> <tbody> <tr> <td>1</td><td>Flamsteed number</td></tr> <tr> <td>2</td><td>Bayer Number</td></tr> <tr> <td>3</td><td>Constellation ID (legal values 0 - 88 arranged alphabetical order)</td></tr> <tr> <td>4</td><td>Greek letter (legal values 0 - 23 arranged alphabetical order)</td></tr> </tbody> </table> <p>A value of 0xFFFF indicates that the value does not exist.</p>	Number	Meaning	1	Flamsteed number	2	Bayer Number	3	Constellation ID (legal values 0 - 88 arranged alphabetical order)	4	Greek letter (legal values 0 - 23 arranged alphabetical order)
Number	Meaning										
1	Flamsteed number										
2	Bayer Number										
3	Constellation ID (legal values 0 - 88 arranged alphabetical order)										
4	Greek letter (legal values 0 - 23 arranged alphabetical order)										
SPECTRA	Three 8 bit Hexadecimal numbers <table border="1"> <thead> <tr> <th>Number</th><th>Meaning</th></tr> </thead> <tbody> <tr> <td>1</td><td>Alpha-numeric character 'O', 'B', 'A', 'F', 'G', 'K', 'M', 'C', 'R', 'N', 'm', 'g', 'k'</td></tr> <tr> <td>2</td><td>Bits 1-4 contain subclass in range 0 - 9. Ignore bits 5-8</td></tr> <tr> <td>3</td><td>Bits 1-4 contain size in range 0 - 6 (Ia, Ib, II, III, IV, V, VI). Ignore bits 5-8.</td></tr> </tbody> </table>	Number	Meaning	1	Alpha-numeric character 'O', 'B', 'A', 'F', 'G', 'K', 'M', 'C', 'R', 'N', 'm', 'g', 'k'	2	Bits 1-4 contain subclass in range 0 - 9. Ignore bits 5-8	3	Bits 1-4 contain size in range 0 - 6 (Ia, Ib, II, III, IV, V, VI). Ignore bits 5-8.		
Number	Meaning										
1	Alpha-numeric character 'O', 'B', 'A', 'F', 'G', 'K', 'M', 'C', 'R', 'N', 'm', 'g', 'k'										
2	Bits 1-4 contain subclass in range 0 - 9. Ignore bits 5-8										
3	Bits 1-4 contain size in range 0 - 6 (Ia, Ib, II, III, IV, V, VI). Ignore bits 5-8.										
RIGHT ASCENSION	Two decimal numbers + 1 Floating Point Number 1 : Hours Number 2 : Minutes Number 3 : Seconds										
DECLINATION	Two decimal numbers + 1 Floating Point Number 1 : Degrees (positive and negative values) Number 2 : Arcmin Number 3 : Arcsec										
PARALLAX	Floating Point number in milli-arcsec Be warned that some of these are negative - I don't know why										
APPARENT MAGNITUDE	Floating Point number										
COMMON NAME	Text String										

To convert Parallax to distance use the following formula:

Distance in Parsecs = $1000 / \text{Parallax (in milli-arcsec)}$

1 Parsec = 3.26 Light years.

BE WARNED THAT SOME OF THE PARALLAX VALUES FROM THE HIPPARCOS CATALOGUE ARE NEGATIVE AND WILL CONSEQUENTLY PRODUCE A NEGATIVE DISTANCE.

To convert Apparent Magnitude to Absolute Magnitude use the following formula:

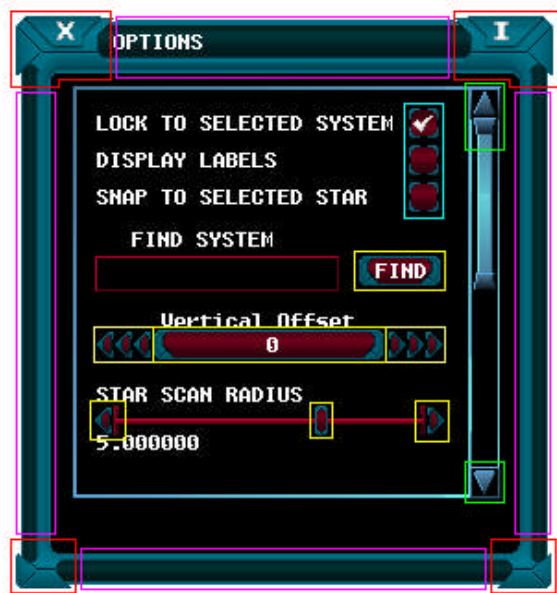
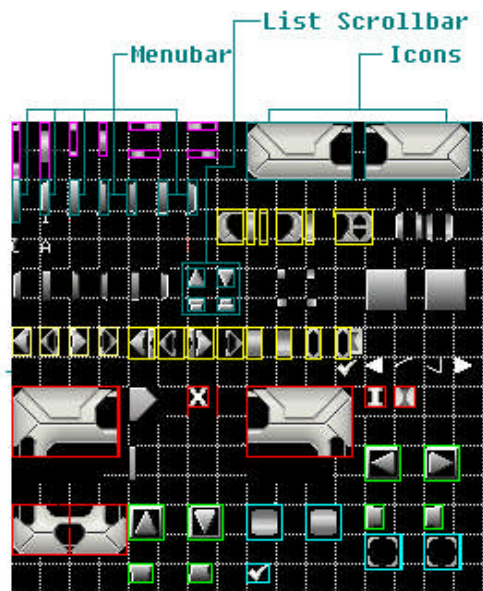
Absolute Magnitude = Apparent Magnitude - $(5.0f \times \log_{10} (\text{distance} / 10.0f))$

APPENDIX I : WINDOW DESIGN

The appearance of the user interface within the game is largely governed by a single texture map 'text_win.bmp' held in the textures directory.

Figure I1 illustrates how its key elements are constructed.

It is not currently possible to adjust the width of the borders, but this may be added at a future date.



APPENDIX J : OBJECT FILES

The object files used within the game take the form of a commented text file which is split into three distinct areas:

- General Description of Objects
- List of Vertices
- List of Faces

General Description Area

FIELD	FORMAT	DESCRIPTION
NAME OF OBJECT	ASCII CHARACTERS	30 Character Object name
NO. OF VERTICES	DECIMAL	Number of Vertices described in the files
NO. OF FACES	DECIMAL	Number of Faces described in the file
NO. BOUNDING SPHERES	DECIMAL	Legacy collision detection mechanism. Should be set to '0'
SIZE ADJUSTMENT	DECIMAL	Legacy field. Should be set to '1'

List of Vertices

FIELD	FORMAT	DESCRIPTION
X	FLOATING POINT	X position of Vertex
Y	FLOATING POINT	Y position of Vertex
Z	FLOATING POINT	Z position of Vertex

List of Faces

FIELD	FORMAT	DESCRIPTION
FACE TYPE	HEXADECIMAL	Type of Face (Hex format) 0 - Texture Mapped 1 - Flat Shaded (Legacy value, which should not be used) Setting the top bit (e.g. 80) indicates that the face should not be used to calculate a vertex normal.
2 FACES	DECIMAL	0 - Face is Single sided 1 - Face is Double sided
RGB COLOURS	DECIMAL	Two pairs of decimal triples - one for each of the two possible faces. This is a legacy field used for flat shading.
TEXTURES	ASCII CHARACTERS	Two pairs of strings which specify the name of a texture map file. This is a legacy field.
NO. VERTICES	DECIMAL	Number of Vertices in face - either 3 or 4
VERTICES	DECIMAL	Index of a Vertex in the Vertex List. Either 3 or 4 such indices should be specified dependent up on how many vertices describe the face.
TEXTURE COORDINATES	DECIMAL	List of X, Y coordinates into the desired Texture Map. One pair of coordinates should exist for each of the face's vertices.

The vertices used to describe the faces should be arranged in an anti-clockwise order.

Objects which are used to describe cylinders take the form of a thin longitudinal slither and effectively represent nothing more than a profile.

APPENDIX K : TEXTURE DESIGN

The Texture Design screen can be accessed via the 'F11' Key and can be used to create procedural templates for gas giants, solid planets, atmospheric and nebula textures. Figure K0 illustrates the structure of the screen.

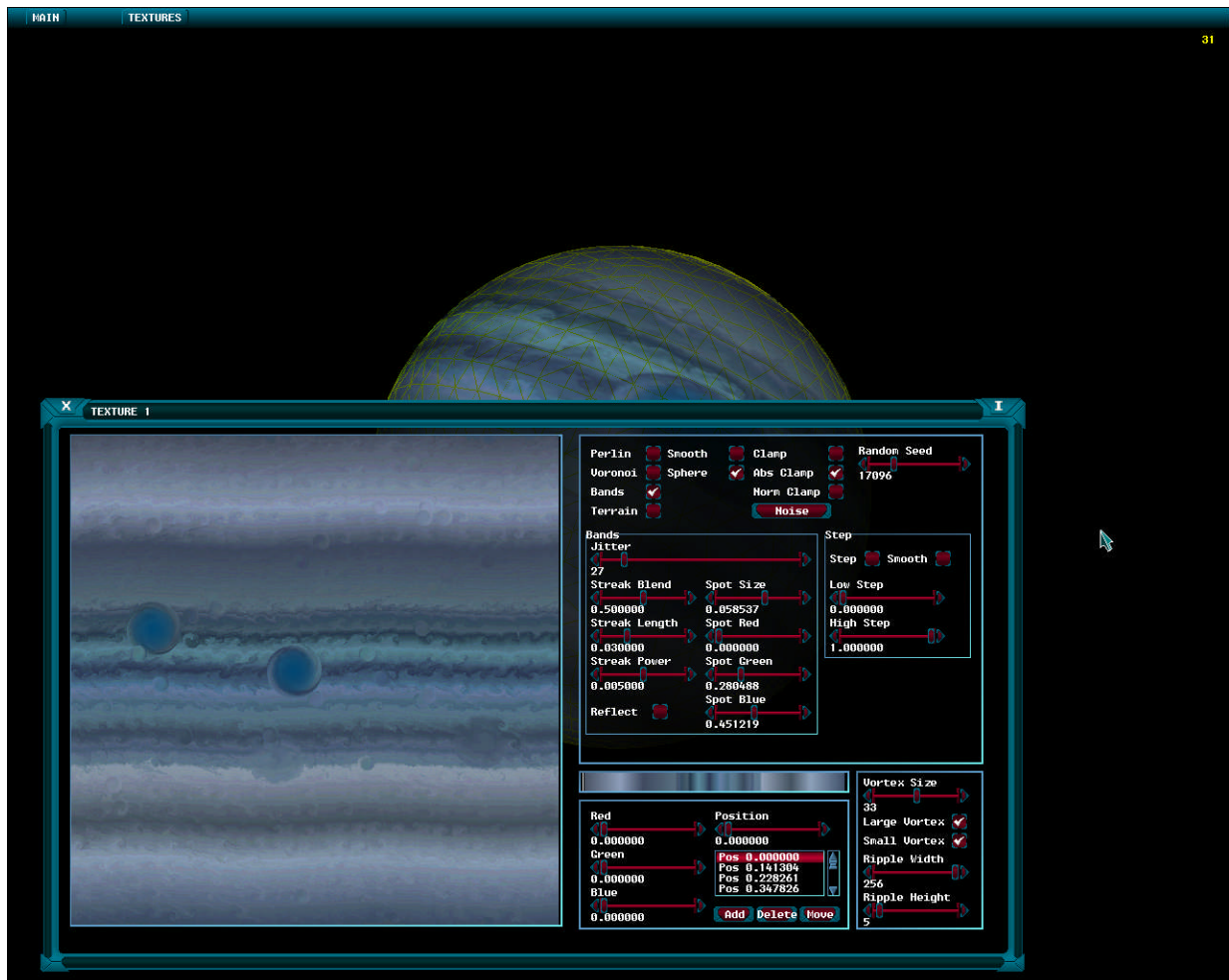


Figure K0

The screen consists of 7 separate windows comprising of the following:

- Texture Window x 4
- Blending Window x 1
- Main Window x 1
- Options Window x 1

The Texture windows allow textures to be generated based upon a configurable type of function. Each of these textures can then be blended via the blending window to produce an overall combined texture which can be saved via the main window. The resulting texture is mapped to a sphere which can be orientated via the options window.

The Screen also supports the following keyboard shortcuts:

KEY	DESCRIPTION
1 - 4	Open / Close Texture Windows 1- 4
B	Open / Close Blending Window
M	Open / Close Main Window
O	Open / Close Options Window
N	Close all Windows

K1 : MAIN OPTIONS

The Main Window as illustrated in figure K1 and is mainly used to allow Texture Templates to be saved and loaded.

The frames titled 'Texture1' - 'Texture 4' should be ignored as their functionality has not yet been implemented.

The List on the far right of the screen displays each of the texture templates held in the 'textures/templates' directory. Any of these textures can be selected and loaded by use of the 'LOAD TEMPLATE' button.

New textures templates can be saved via the options in the top left hand corner. The saved texture will be placed in the 'textures/templates' directory.

The 'GENERATE' button can be used to trigger a texture to be generated based on the current template.

The other 'GENERATE' buttons are not currently implemented and should be ignored.

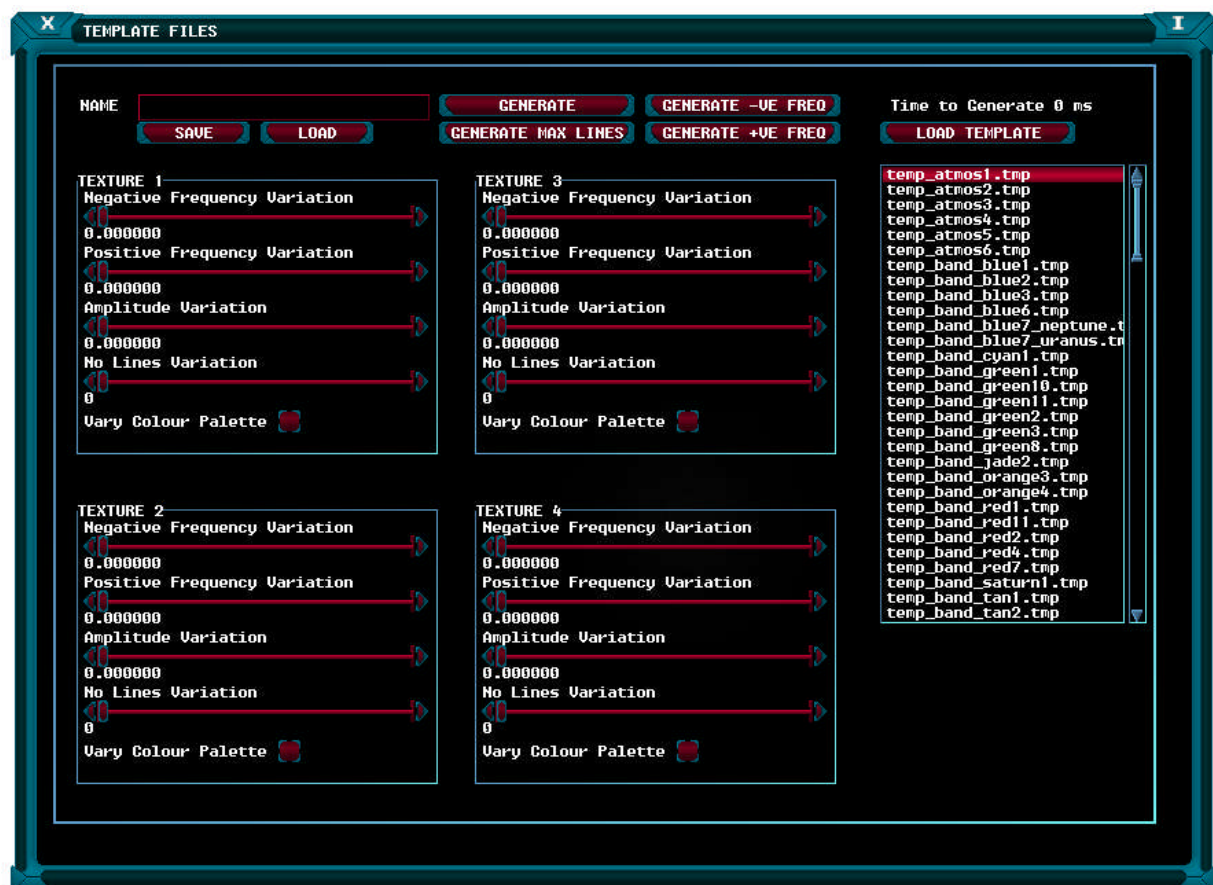


Figure K1

K2 : TEXTURE WINDOWS

The Texture window, as illustrated in Figure K2, can adopt three different formats dependent upon the type of noise function selected.

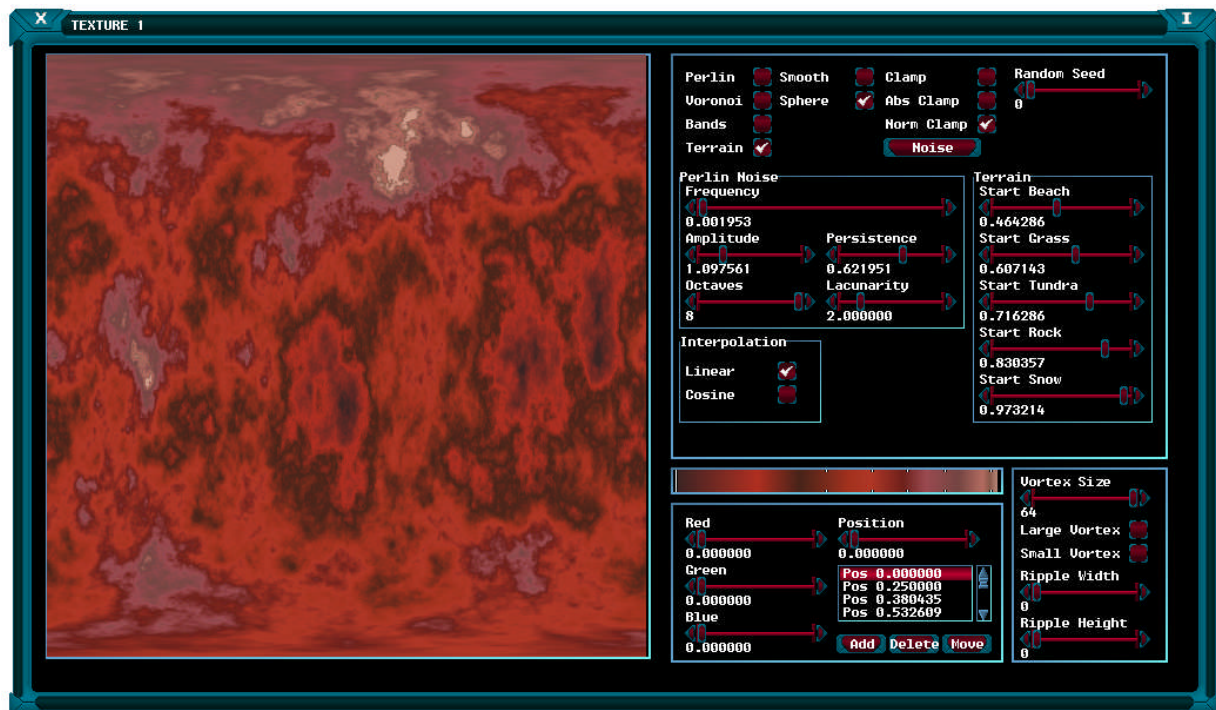


Figure K2

The options at the top of the screen are described in the following table:

OPTION	DESCRIPTION
NOISE	Generate Noise texture according to the current settings
PERLIN	Select Perlin Noise - Produces cloud like textures
VORONOI	Select Voronoi Noise - Produces cell like textures
BANDS	Select Bands - Produces textures geared towards Gas Giants
TERRAIN	Select Terrain Noise – Similar to Perlin Noise but geared towards Solid Planets
SMOOTH	Smooths the texture - currently deactivated
SPHERE	Map the texture to a sphere - will typically take far longer to create
FADE	Fade the texture at the poles of a sphere. This allows the texture to be grafted to the top and bottom of the sphere such that the joins are less apparent.
TILEABLE	Allows a texture that is not sphere mapped to be made 'tile-able'.
CLAMP	Standard Clamping. Clamps negative results to 0 and positive results to 1. Tends to produce textures that occupy the lower portion of the palette.
ABS CLAMP	Absolute Clamping. Converts negative results to positive ones which are clamped at 1. Tends to produce noisy textures which occupy the full palette range.
NORM CLAMP	Normalised Clamping. Tends to produce textures which occupy the mid portion of the palette
RANDOM SEED	Seed for random number generator

The options at the bottom left of the window allow the palette to be configured. The results from the noise function are used as an index into this palette in order to retrieve the required colour.

OPTION	DESCRIPTION
RED	Red component
GREEN	Green Component
BLUE	Blue Component
POSITION	Position in Palette
LIST	List of distinct colours in the palette described in terms of their position
ADD	Add a new colour to the Palette
DELETE	Delete selected colour from palette
MOVE	Move selected colour to new position

Perlin Noise options are described in the following table

OPTION	DESCRIPTION
FREQUENCY	Frequency of the Noise. High frequencies produce more disruptive textures
AMPLITUDE	Initial amplitude of the Noise. Higher values will produce textures which occupy the higher parts of the palette.
OCTAVES	Number of iterations. With each iteration more detail is added. Low values tend to produce blurred textures.
PERSISTENCE	Increase in amplitude for each iteration.
LINE INTERPOLATION	Tends to produce 'spiky' textures.
COSINE INTERPOLATION	Tends to produce 'smooth' textures
NO LINES	Values greater than 1 will cause the noise to be generated as horizontal lines
THIN LINES	Causes the 'Lines' to be 'thinned'
INNER LINES	Causes the outer lines to be culled.

Voronoi Noise options are described in the following table

OPTION	DESCRIPTION
FREQUENCY	Frequency of the Noise. High frequencies produce more disruptive textures
AMPLITUDE	Amplitude of the Noise. Higher values will produce textures which occupy the higher parts of the palette.
MANHATTAN	Produces cellular noise which takes the form of diamond shapes.
CHEBYSHEV	Produces cellular noise which has a scale like structure
DUAL DISTANCE	Produces more complex textures

Banding options are described in the following table

OPTION	DESCRIPTION
JITTER	Amount of high frequency jitter to be applied to bands.
STREAK BLENDING	Degree of blending of diagonal streaks through texture - a value of Zero disables streaks.
STREAK LENGTH	Length of diagonal streaks through texture - a value of Zero disables streaks.
STREAK POWER	Gradient of diagonal streaks through texture.
SPOT SIZE	Size of 'Spots' in texture - a value of Zero disables spots.
SPOT RED	Red Component of Spot
SPOT GREEN	Green Component of Spot
SPOT BLUE	Blue Component of Spot
REFLECT PALETTE	Reflects the Palette between the top and bottom halves of the texture.

Terrain options are basically identical to those of Perlin Noise but contain a separate area on the right-hand side that indicates at which point various types of terrain should start. The position of each form of terrain is also indicated in the palette area.

The bottom right-hand corner of the window allows a number of effects to be applied to the texture

OPTION	DESCRIPTION
VORTEX SIZE	Size of Vortices in pixels
LARGE VORTEX	Causes large swirling vortices to be applied to the texture.
SMALL VORTEX	Causes small swirling vortices to be applied to the texture.
RIPPLE WIDTH	Configures the width of a ripple to be applied by the texture. In order for the effect to be tile-able the width should be able to divide into 512.
RIPPLE HEIGHT	Configures the height of a ripple to be applied by the texture. In order for the effect to be tile-able the height should be able to divide into 512.

K3 : BLENDING WINDOW

The Blending Window in Figure K3 and allows each of the four possible sub textures to be blended into a single one.



APPENDIX L : STAR SYSTEM DESIGN

Ad Astra contains a comprehensive Star System Editor that can be accessed via the 'F8' key. The screen presented initially appears identical to that of the Galactic Map, however selecting a Star allows its celestial bodies to be added, deleted or their appearance to be changed.

It should be noted that any configuration for a selected system will be lost if a different star is selected or the editor screen is left. Hence it is vital that the 'SAVE' button is pressed on a regular basis and after any desired configuration has been applied in order to prevent loss of data. The star systems themselves are saved in files in the 'galaxy/systems' directory such that the actual file name is based on the hipparcos number. Thus the system illustrated in Figure L1 would be saved as the file 'hip_51819.txt'. In order to revert back to pseudo random generation of a particular system then the relevant file should simply be deleted.

L1 : ADD PLANET

Provided that the maximum number of nine main planets orbiting the central star has not been exceeded then a new planet can be added to the system as illustrated in Figure L1. Both the planets type and position can be specified and once the 'Add Planet' button has been selected then the new body will appear in the systems details.

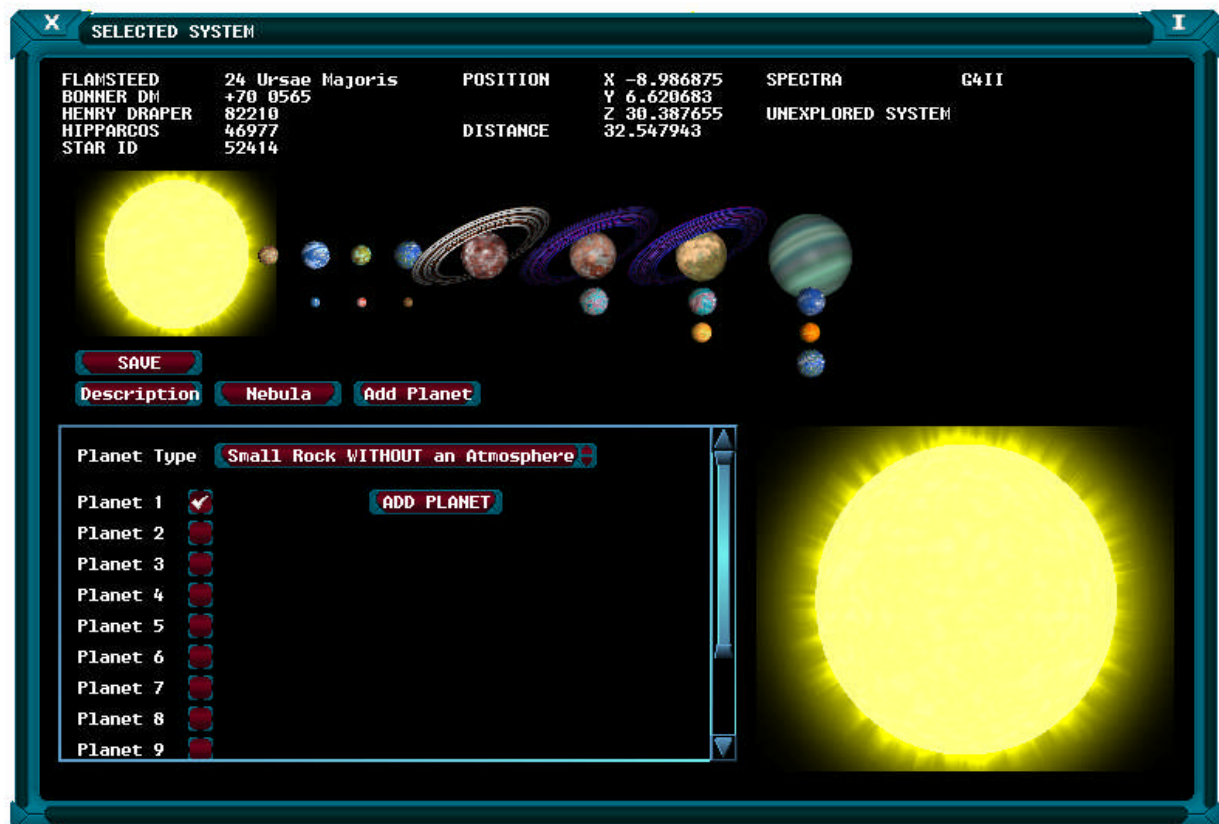


Figure L1

L2 : ADD MOON

It is possible to add a moon to one of the main planets up to a maximum of three such bodies. The format of the screen is similar to that of the add planet window and the new moon will appear once the 'Add Moon' button has been pressed. In the example below a small barren planetoid will be added as the first moon to the fifth planet.

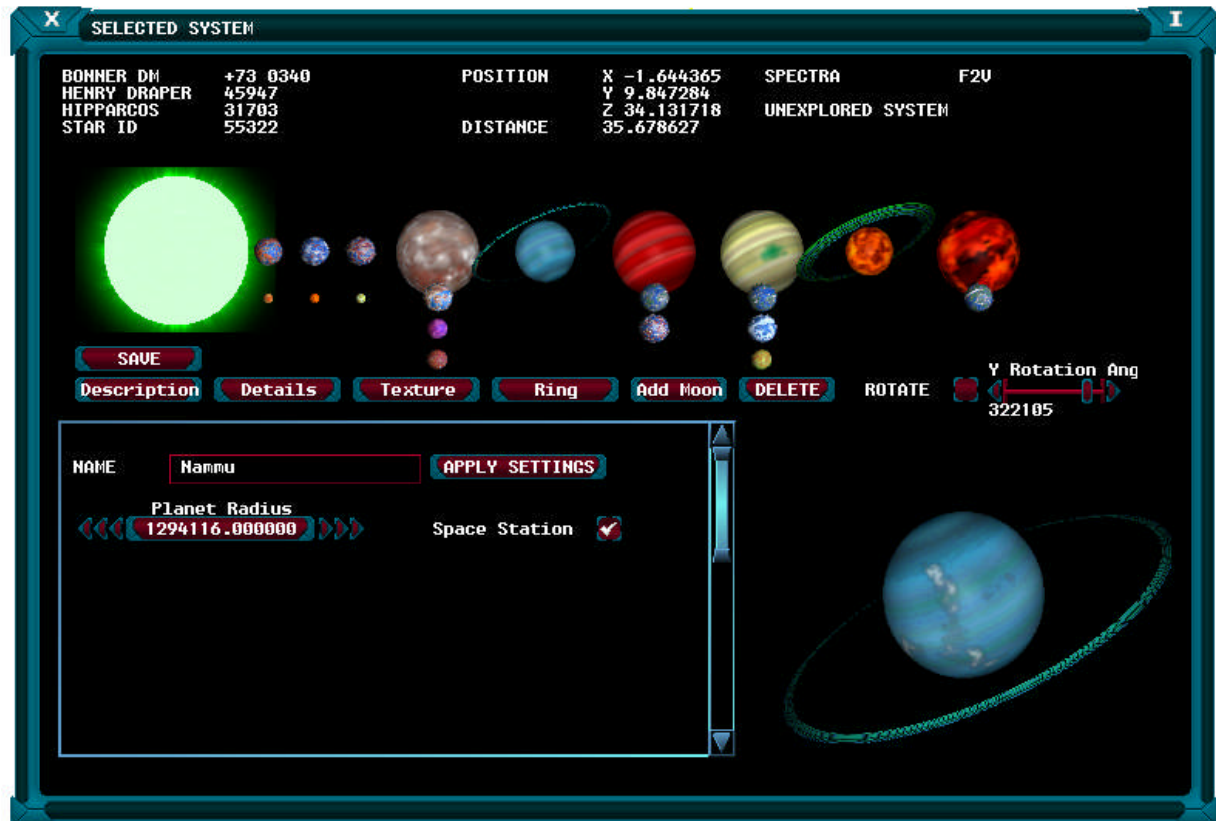


Figure L2

L3 : PLANET/ MOON DETAILS

Selecting a planet will allow its basic details to be changed. As shown in Figure L3 it is possible to specify the planets name, its radius, number of cities/ towns/ volcanoes and also to indicate whether a Space Station is present. Once the desired configuration has been specified then the 'Apply Settings' button should be pressed otherwise they will be lost.

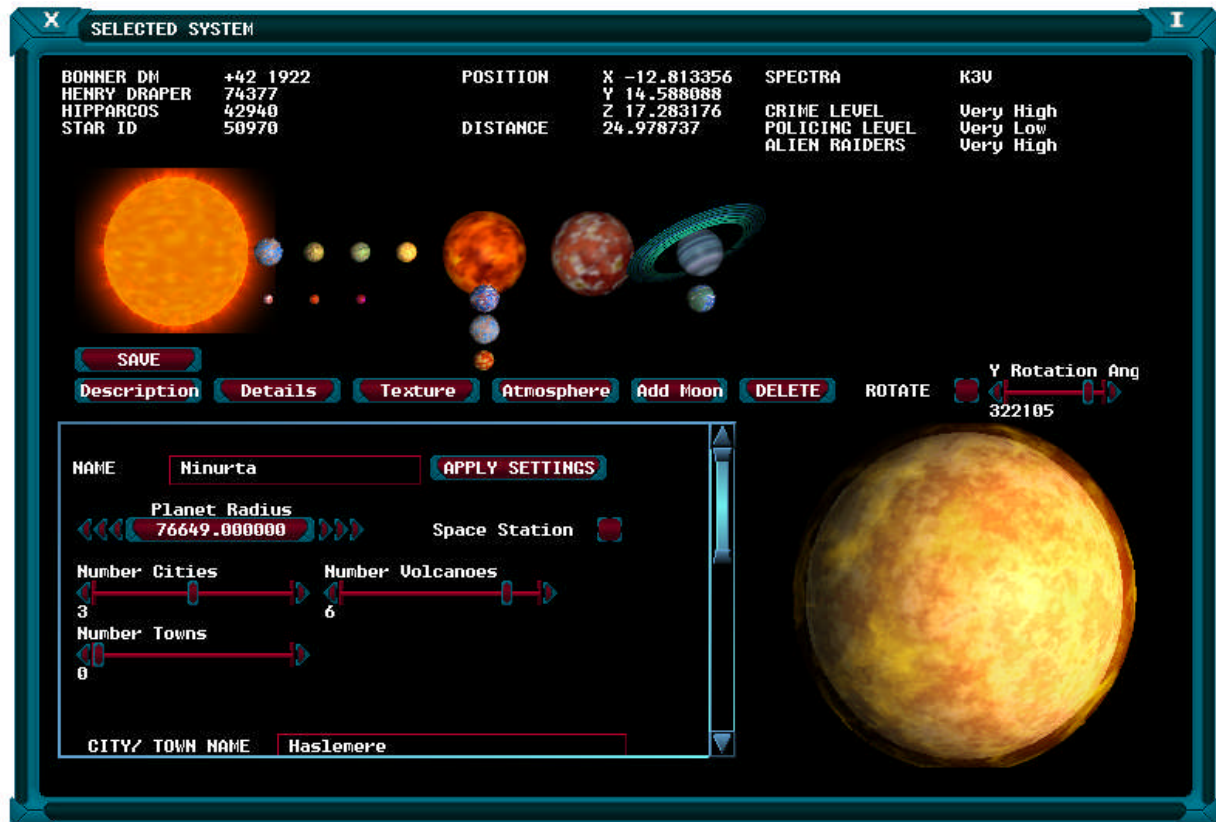


Figure L3

L4 : PLANET TEXTURE

The appearance of the planet can be modified via the 'Texture' option shown in Figure L4. The list on the left hand side allows a particular type of texture to be selected and the random seed button will allow that texture to be modified to a limited degree. Selecting the 'Apply Settings' button will cause the required options to be applied to the planet.

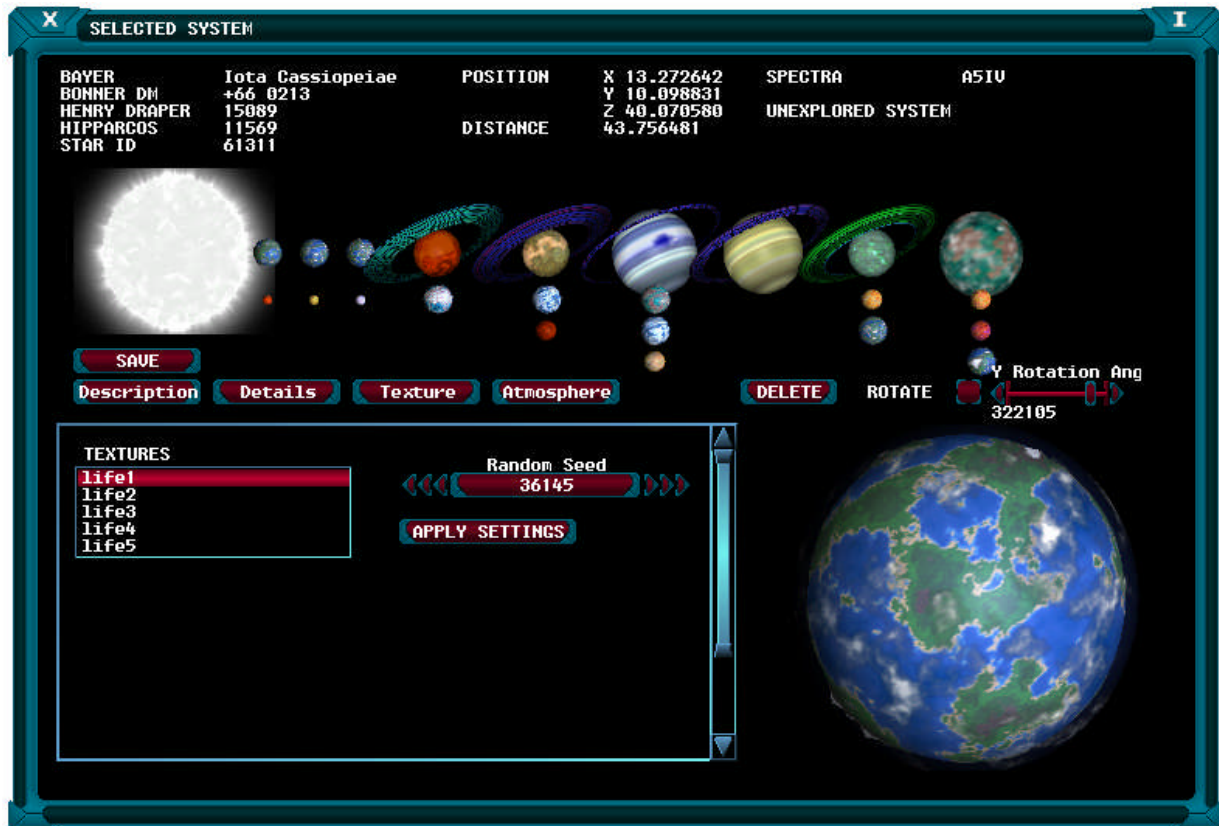


Figure L4

Further textures can be designed using the Texture Design screens described in Appendix K and the resulting files copied into the appropriate 'template' directory under 'textures/planets'. Solid planets should always use the 'terrain' texture option whereas Gas Giants should use either the 'Perlin noise' or the 'Bands' option.

L5 : PLANET RING

It is possible to add a ring to a gas giant and modify its appearance as illustrated in Figure L5. Once the dimensions have been configured and its colours specified then pressing the 'Apply Settings' button will cause the new version of the ring to be constructed.

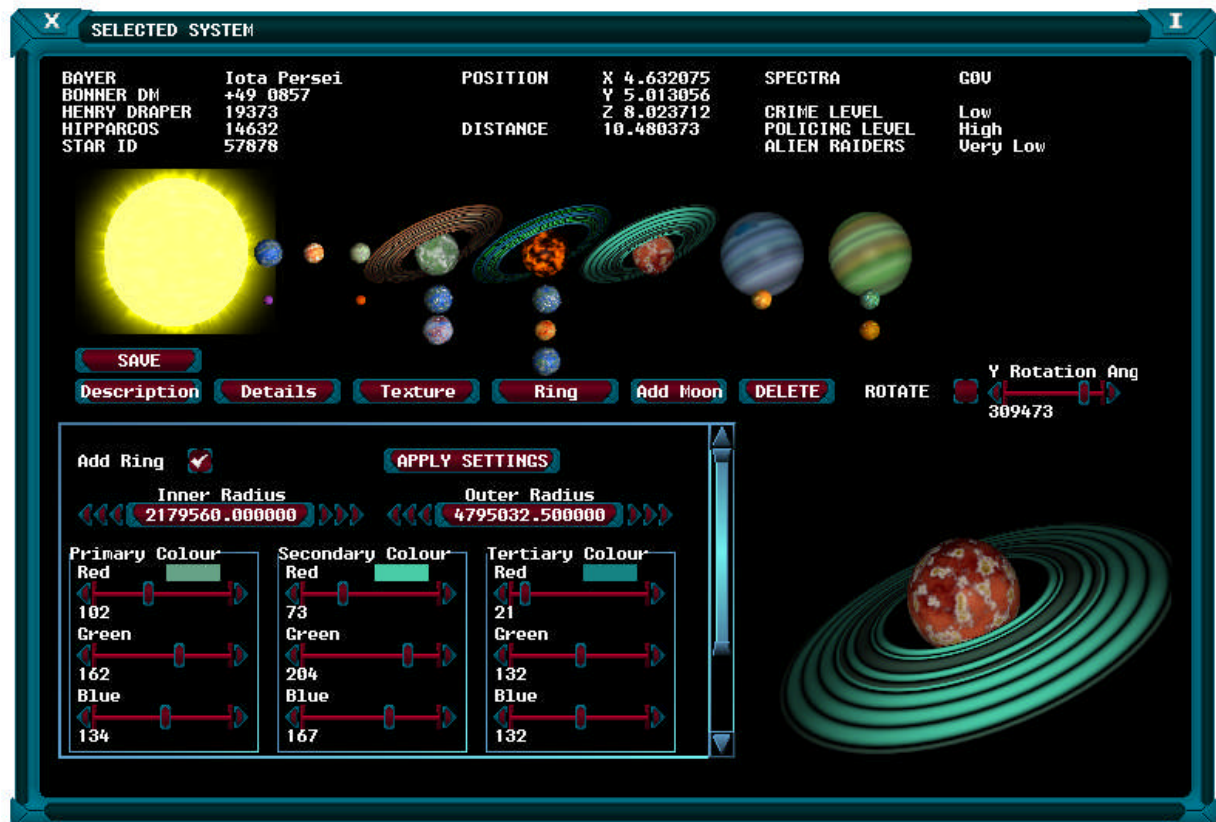


Figure L5

L6 : PLANET ATMOSPHERE

For planets that possess an atmosphere then it is possible to configure the cloud, sky and fog properties. The texture list on the left hand side of the window allows the cloud structure to be specified whereas the series of four boxes below (the fog box can be found by scrolling down) enable the cloud, sky and fog colouration to be set. The fog density can be configured such that lower values increase the fog density, thus a value of zero would be very dense whereas a value above one would be fairly clear.

It should be noted that for dense fog then its colour should be a fairly similar match to that of the inner sky colour otherwise the 'fogged' landscape will not blend into that of the background sky.

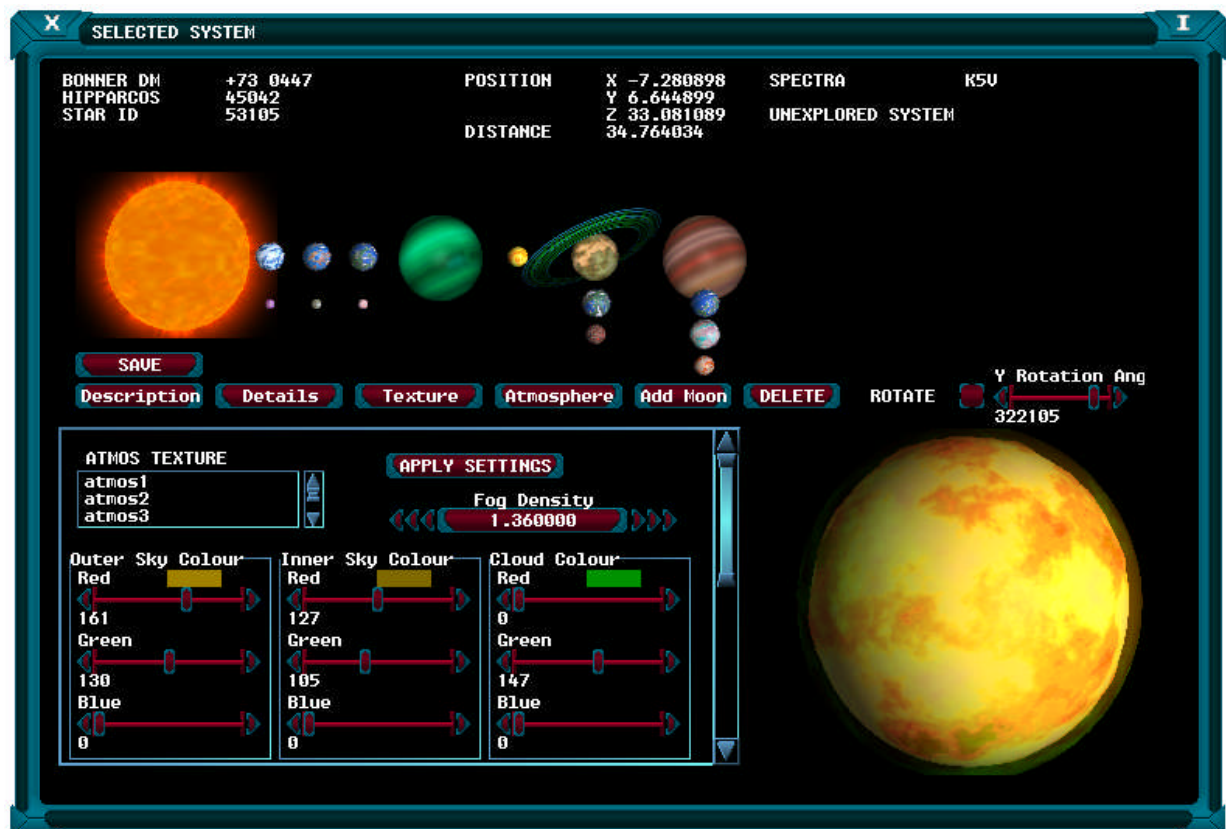


Figure L6

The effects of the fog configuration can be viewed if the atmosphere of the selected planet is entered via the main screen. Thus the fog and inner sky colours will be modified when the 'Apply Settings' button is pressed and the System Editor screens are exited. However to ensure that values are not lost when the System Editor screen is re-entered then the 'Save' button should also be selected before leaving the screen.

L7 : BACKGROUND NEBULA

The background nebula for the selected system can be specified by simply selecting the relevant texture from the list as illustrated in Figure L7.

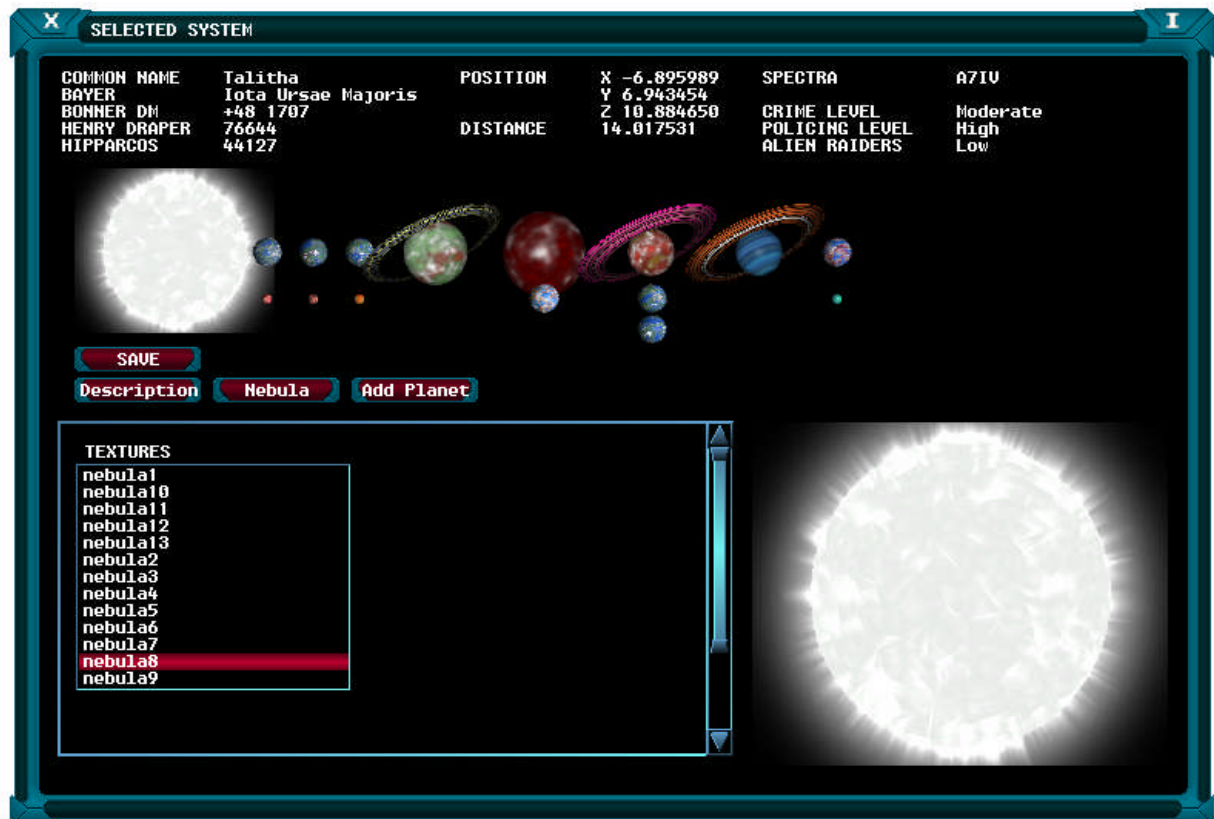


Figure L7

Further textures can be designed using the Texture Design screens described in Appendix K and the resulting files copied into the 'textures/planets/nebula_templates' directory.