



FRONTIER

E L I T E
II

MANUAL
KATHY DICKINSON

SUE CRIPPLE & SNEER

SOLICITORS

Windrush Tower • Olympus Village • Mars • Sol System • O/OS04 0L1

YOUR REFERENCE: SCS / CPJ-4.1

OUR REFERENCE: CPJ / JJJ-4.1

J. Jameson Jnr
51a, South Dormitory
Fish Processing Plant 3142
Sirocco
Merlin
Ross 154
-1/0Rs2a S16

31.12.3199

To whom it my concern,

It is our duty to inform you of the death of your grandfather, Commander Peter Jameson.

The wreckage of his ship was found in the Reidquat system on 11 November 3199. He was presumed killed in combat after a 'misunderstanding' over some stolen goods according to the local press.

A last will and testament was prepared on 3 February 3199 and section 4.1 has been circulated to all living grandchildren as instructed by our late client.

If you have any queries do not hesitate to contact us. The normal fees of fifty (50) Credits per hour (including service tax) apply.

Yours sincerely,



Mr. Edmond Sneer

Last Will & Testament

Commander Peter Jameson

Section 4.1

A way of life that is very different to the dull, planet-bound existence you have probably led up to now. It is a way of life that I loved and want you to experience.

I want you to feel the freedom of flying your own ship and being able to explore the vast galaxy. Whatever your aims in life (I settled for wealth, power and fame) there is an occupation for you. Try your hand at trading, following established trading routes or making your own. May be doing odd jobs is more your style, buzzing from one place to the next, never working for the same person twice. What about mining? Later perhaps.

I know that some of you will succumb to a criminal existence, so I may as well say that piracy, bounty hunting and mercenary work will suit you.

I won't tell you to place your allegiance with the Federation, the Empire or the Independents but be careful - they all use you for their own aims. No amount of treaties will change the fact that they dislike each other.

Space has changed a great deal since I was your age. No, I am not going to harp on about everything being cheaper and friendlier in the past. People were just as bad then as now but we now have better technology and humans have spread further, so there is more scope. Your abilities as a pilot will be tested to the full, especially in combat, so before you upset anybody, get in some practice.

I want to give you the best start I can. As there are now so many of you, my resources have been spread thinly. Each of you will receive an Eagle Long Range Fighter and one hundred (100) credits. The ship has been delivered to your local starport but the documents are enclosed with this letter.

Above all, enjoy yourself and BE WARY!

Mortal Press 2/2TX4-LWT

WELCOME!

CONGRATULATIONS on buying the Eagle Long Range Fighter, clearly the purchase of a discerning pilot!

As you will no doubt have noticed, our continual quest for excellence has resulted in this, the culmination of the search for the most advanced technology and ergonomic design, embodied in one ship. We are proud of the individualistic style married with functional superiority, as we continue the Faulcon De Lacy pedigree.

As you are obviously a cut above the common space traveller, the understated styling of the interior will have impressed you. A dynamic spacehound such as yourself will not have time for unnecessary frills, so we have styled the interior with the minimum of fuss, just like the exterior. Particularly pleasing though, are the lines of the pilot's seat made of revolutionary Silastoplaston, a material that stays dry at all times. It really gives the message that you are in control! It feels as though you are immersed in water while it protects you from dangerously high acceleration forces.

Always mindful of necessity we have included the 1MW Phlaschgyt Pulse Laser weapon. The laser is noted for being compact, economical and again understated - the hallmark of this craft. As if that is not enough, we have installed the latest Manolife one man life support system that keeps you cooking at the right temperature and nasty gases at bay. We have been accused of madness for giving away lots more as part of a limited period offer, just look at the specifications list!

Whether on the run or just cruising, feel that tight gyroscopic control. You will be so thrilled with the Eagle that you will want to purchase accessories, available from all good Shipyards.

THE EAGLE LONG RANGE FIGHTER

TECHNICAL SPECIFICATIONS

THE HULL A 25 tonne ship with a 20 tonne hull capacity. An amazing 15 tonnes of equipment is included in the price leaving you with a 4 tonne capacity cargo bay with 1 tonne of fuel.

Dual main thrusters capable of a blistering peak acceleration of 25g or 0 to 1000 kilometres per hour in only 1.13 seconds.

FREE! Atmospheric Shielding for heat protection on entering atmospheres.

WEAPONRY 1 Megawatt Pulse Laser (front mounting only).
2 Missile Mountings giving you a choice of missiles.
FREE! Not one but TWO KL760 homing missiles.

DRIVE Class 1 Hyperdrive with a range of 8 light years.

FREE! 1 tonne of Hydrogen Fuel giving you 8 light years travel.

FREE! Autopilot.

CONTROLS Scanner incorporating the Galactonav System.

ENVIRONMENTAL CONTROL Manolife Life Support System.
Silastoplaston pilot's seat.

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C O N T E N T S

FRONTIER ELITE II

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SECTION ONE

ICONS

USING THE CONSOLE

This is a guide to using the console (**Fig 1**) to control your ship. There is also a summary sheet which summarises the use of the icons.

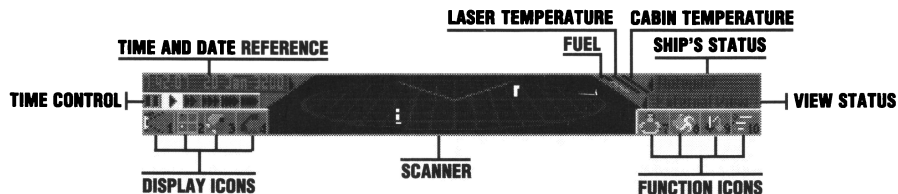


Fig 1: the ship's console

SELECTING AN ICON

The icons are activated by first touching them with the tip of the mouse-controlled pointer and then pressing the left-hand mouse button. Alternatively, simply use the keyboard shortcuts (for the main icons there are function keys **F1-F10** the number of which is shown at the bottom right-hand corner of the icon). Note that all icons give an indication of what will happen if that icon is selected. They do not show the current mode.

- The four main icons **F1-F4** to the left-hand side of the scanner select the current type of display.
- The icons on the right-hand side **F7-F10** change depending on the active display.

This section outlines the four main types of display and their associated functions.

VIEW ICONS (F1)

These icons allow you to cycle through a choice of views of the space through which you are travelling. They are: Front, Rear and External (and Turret if fitted). The position of the view from your ship is described in the View Status area.



FRONT VIEW This gives the view in the direction in which your ship is pointing. It is not necessarily the direction in which you are travelling. If you have a gun at the front, a sight will be positioned on the screen in the shape of a cross.



REAR VIEW A view in exactly the opposite direction to the front view. A sight will only be visible if you have a gun mounted on the rear.



EXTERNAL VIEW An external view is simulated by your on-board computer and can be useful for aligning your ship. Some landings are particularly pleasing if viewed in this mode. Use the **Arrow (Cursor)** keys to change the angle of view, the - key to zoom in and the + key to zoom out. This can be used for general surveillance of the surrounding space.

It needs to be borne in mind that the view is locked to the orientation of the ship. For example, if you are looking at the craft from the side and it is rolling, you will not see it roll, but the space around it will appear to move and the craft will stay still.



TURRET VIEW If you have top or bottom turrets on your ship this icon will become available and is needed in order to fire lasers from turrets. If you have two turrets (top and bottom) and you select this icon, the view presented will come from the turret you were using last. Use of the right-hand mouse button will move the angle of view, not the orientation of the ship. If, when using the mouse, you dip below the level of the turret, the view automatically changes to the other turret if you have one.

FLIGHT CONTROL ICONS (F7)

This icon on the right-hand side of the display is operational in View mode only. It switches between Engines Off (**Fig 2**) and Manual flight (**Fig 3**). If you have an Autopilot and have selected a target (see THE AUTOPILOT on page 20), then the Flight Control icon will cycle through Autopilot (**Fig 4**) too. When you are landed, the Vertical Take-Off icon (**Fig 5**) is the only option available. The status of your ship and its engines is described in the Ship Status area.



Fig 2: Engines Off icon



Fig 3: Manual Flight icon



Fig 4: Autopilot icon



Fig 5: Vertical Take-Off icon

HYPERSPACE ICON (F8)

While in View mode select this icon (**Fig 6**) to make a hyperspace jump. See the NAVIGATION AND FLIGHT section on page 23 for details.



Fig 6: the Hyperspace icon

UNDERCARRIAGE ICON (F9)

In View mode use of these icons raises or lowers the undercarriage (**Fig 7** and **Fig 8**). The Autopilot does this automatically when landing, but in Manual Flight you must operate it yourself.



Fig 7: raise undercarriage icon



Fig 8: lower undercarriage icon

IDENTIFICATION TEXT ICONS (F10)

In View mode these icons (**Fig 9** and **Fig 10**) are used to name all identified objects on your display to aid navigation as the name can sometimes be seen before the body itself.



Fig 9: Identification text ON icon



Fig 10: Identification text OFF icon

MAP ICONS (F2)

These icons cycle through two map pages: Galactic Map (**Fig 11**) and Current System Map (**Fig 12**). See the NAVIGATION AND FLIGHT section on page 11 for a more detailed description. Note that the functions of icons **F7** to **F10** are not always the same in Galactic Map and Current System Map (see below).



Fig 11: Galactic Map Icon



Fig 12: Current System Map Icon

GALACTIC MAP ICON (F2)

A grid map of all the star systems in the galaxy is displayed and the following options are available:

DATA ICON (F6)

Gives geographical and physical data on the selected system if it has been explored. This is only present if a system has been selected.



Fig 13: the Data Icon

Selecting the Data icon calls up the following four functions:



GALACTIC MAP (F6) Returns you to the Galactic Map.



ECONOMY ICON (F7) Gives data on imports, exports and illegal goods for the selected system.



SOCIAL STRUCTURE ICON (F8) Gives data on government type, population etc. for the selected system.



ORBITAL MAP ICON (F10) Provides a diagram of the orbits of all bodies within the system shown. They can be seen in motion using the Forward and Rewind icons (see below). For closer observation of bodies use the Zoom icons **F7** and **F8**.

ZOOM ICONS (F7, F8)

Allow the view to be magnified (**Fig 14**) or reduced (**Fig 15**), except in Data mode **F6** where **F7** and **F8** are redefined for other uses.



Fig 14: zoom IN icon



Fig 15: zoom OUT icon

TOOLS ICON (F9)

The galactic map can be redefined for easier and faster use.



Fig 16: the Tools icon

Selecting the Tools icon calls up the following four functions:



STALKS ICON (F7) Turns height indication stalks on the galaxy grid map on or off.



GRID ICON (F8) Turns grid on the Galactic Map on or off.



TRADE ROUTES ICON (F9) Turns trade routes on the Galactic Map on or off.



IDENTIFICATION TEXT ICON (F10) Some text on the Galactic Map can be turned on or off.

GALACTIC VIEW ICON (F10)

Shows a creator's eye view of the galaxy to remind you of how small you are. The brightness of each pixel depends on the number of stars in the area covered by that pixel. Use the Zoom icons **F7** and **F8** to adjust the view. Select the Galactic Map icon **F10** (**Fig 18**) to return to the Galactic Map.



Fig 17: the Galactic View icon



Fig 18: the Galactic Map icon

CURRENT SYSTEM MAP (F2)

Shows an orbital map of the system through which you are travelling. Again, bodies can be seen in motion or at close range. Use the Zoom icons **F7** and **F8** to adjust the view. The following options are also available:

TOOLS ICON (F9)

The orbital map can be redefined for easier and faster use.



Fig 19: the Tools icon

Selecting the Tools icon (**Fig 19**) calls up the following two functions:



ORBITAL ICON (F9) Turns orbital lines on or off.



IDENTIFICATION TEXT ICON (F10) Turns names of bodies on or off.

TARGETING ICON (F10)

Enables you to select targets for combat or the Autopilot. Do this by activating this icon (**Fig 20**), then clicking on the body to be targeted. See the **COMBAT** section on page 35 and the **NAVIGATION AND FLIGHT** section on page 11.



Fig 20: the Targeting icon

INVENTORY ICONS (F3)

If activated, this icon will cycle through seven information pages, in order:



SHIP'S EQUIPMENT (see the SHIPYARD section on page 49)



COMMANDER PROFILE (see the COMBAT section on page 35)



CREW ROSTER (see the TRADING section on page 55)



CARGO ON BOARD (see the TRADING section on page 55)



PASSENGER ROSTER (see the TRADING section on page 55)



OUTSTANDING CONTRACTS LIST (see SHIP'S INVENTORY on page 60)



MINING INSTALLATIONS (see the MINING section on page 65)

See also SHIP'S INVENTORY on page 60 for a summary of the pages' contents. Note that if there is no information on a page it will not be displayed.

COMMUNICATION ICON (F4)

The effect of this icon (**Fig 21**) is different depending on whether you are landed (or docked) or in flight.



Fig 21: the Communication Icon

COMMUNICATION WHILE LANDED (OR DOCKED)

When this icon is selected a list of options will appear (**Fig 22**), for example **Stockmarket** (see the TRADING section on page 55), **Bulletin Board** (see the TRADING section on page 55), **Launch Request** (see the NAVIGATION AND FLIGHT section on page 30) and **Shipyard Services** (see THE SHIPYARD section on page 49).

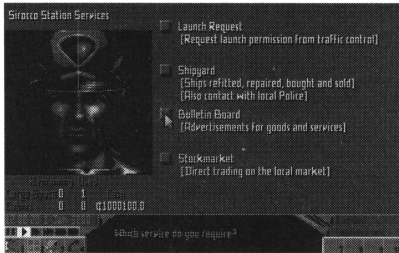


Fig 22: communication while landed (or docked)

COMMUNICATION IN FLIGHT

A list of messages to be broadcast will be superimposed on the main display (**Fig 23**). Options include a request for landing or docking clearance and sending messages to others. Some will provide a further list of communications, for example **Broadcast message to all in range...** which allows you to send distress calls or demands for surrender. You can also contact the police and settle any outstanding fines by remote payment. See the TRADING section on page 55, the COMBAT section on page 35, and the NAVIGATION AND FLIGHT section on page 11.

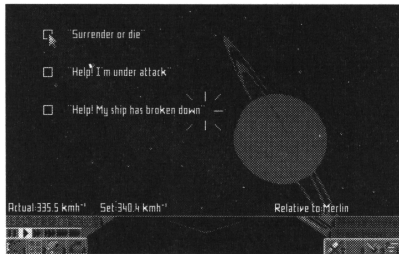


Fig 23: communication in flight

FORWARD AND REWIND ICONS

They are only displayed when orbital maps are in use (see the NAVIGATION AND FLIGHT section on page 11), and are used to show the position of bodies at different points in time. The simulated time is displayed at the bottom left-hand corner of the screen.

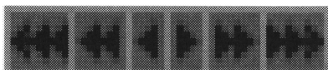


Fig 24: the Forward and Rewind Icons

TIME CONTROL ICONS

These allow the pilot to alter the apparent speed of time. The single arrow means real time and the arrows to the right increase the passage of time by 10 to 10,000 times. The icon on the far left-hand side is a pause button to halt everything. See the NAVIGATION AND FLIGHT section on page 11 and the TRADING section on page 55. The pilot should realise that his enemies are similarly sped up, so using these icons will only make a dodgy problem worse.



Fig 25: the Time Control Icons

THE WEAPON CONTROL PANEL

Call up the Weapon Control Panel (**Fig 26**) by selecting the Scanner area.

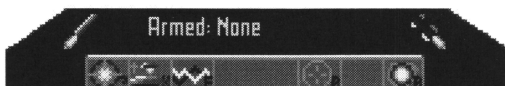


Fig 26: the Weapon Control Panel

Some items of your ship's equipment do not have icons because they work automatically. Those that do have an icon which needs to be activated in order for them to function are illustrated in the grey boxes. In the bottom right-hand corner of the icon, the letter for the keyboard short-cut is shown. The separate icon guide lists the weapon and equipment icons. See also the COMBAT section on page 35 for details of use of weapons and APPENDIX ONE: SHIPYARD EQUIPMENT on page 69 for technical details of weapons and equipment.●

SECTION TWO

NAVIGATION

AND FLIGHT

NAVIGATION

One part of your ship that is impressive is the Galactonav space navigation facility, built in to all space craft. You have a number of facilities at your disposal by using the Map icons F2 (**Fig 27** and **Fig 28**).



Fig 27: Galactic Map Icon



Fig 28: Current System Map Icon

Those icons cycle through two maps: the map of the galaxy and a current map of the system in which you are travelling. Depending on which map you are viewing, the icons on the bottom right-hand side of your console have different functions (see GALACTIC MAP ICON on page 5 and CURRENT SYSTEM MAP ICON on page 7).

VIEWING THE GALAXY IN DETAIL USING THE GALACTIC MAP

Select the Galactic Map icon **F2** to obtain a map of all the star systems in the galaxy (**Fig 29**), thanks to the Galactic Survey of 2817. The positions of all 100,000,000,000 stars (approximately) were mapped as soon as technology provided telescopes sophisticated enough to do the job.

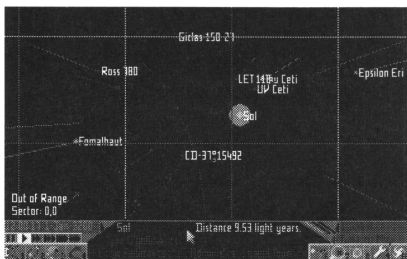


Fig 29: the Galactic Map

A grid is drawn through the plane of the galaxy to aid visual orientation and provide navigational coordinates. The galaxy is divided up into sectors. Since the galaxy is thin and flat, sector coordinates are only two dimensional with a sector measuring eight light years along each edge and containing all the stars above and below it. Sector boundaries are shown in bright green on the map, and their coordinates are given relative to the Solar system for historical reasons. ►

► From Sol's sector, 'east' and 'west' coordinates are represented by the first coordinate, 'east' being a positive and 'west' a negative number. Similarly, 'north' and 'south' are represented by the second number, with 'north' positive. Up to nine sectors are displayed at once on the screen and the coordinates of the central sector are displayed at the bottom left-hand corner. Each star is shown coloured according to type (eg, red for a red giant, blue for a hot blue star) and with a line indicating its height 'above' or 'below' the galactic plane.

The pink lines linking systems are recommended trade routes in case you feel you need some guidance to start with. They were compiled by the Zebulon Intergalactic Trading Corporation five years ago.

MOVING AROUND THE GRID

1. To move around the grid, use the **Arrow (Cursor)** keys. The system in the centre is highlighted in green and a small amount of information on it is shown on the console. The system you are currently travelling through is highlighted in pink.
2. To change the angle of the grid itself (**Fig 30**), to see the relative positions of systems more clearly, hold down the right-hand mouse button and move the mouse.

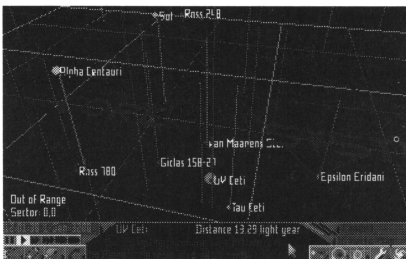


Fig 30: changing the angle of the Galactic Map grid

3. You can zoom in and out with the Zoom icons **F7** and **F8**.
4. You can re-centre the map by pressing the **C** key.

MANIPULATING THE GALACTIC MAP

Once familiar with the grid, faster operation can be achieved by electing to discard certain features (**Fig 31** and **Fig 32**). Select the Tools icon **F9** and four different icons become available which enable you to adjust certain features of the grid.

- The Stalk icon **F7** will turn the distance lines on or off.
- The Grid icon **F8** will turn the grid on or off.
- Trade icon **F9** will turn the trade routes on or off.
- The Identification Text icon **F10** will remove the incidental and other details like **Core System**.



Fig 31: maximum Galactic map detail

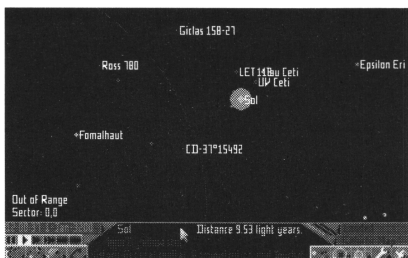


Fig 32: minimum Galactic Map detail

As you elect to do any one, the four icons disappear but can be brought back again with the Tools icon **F9**.

OBTAINING DATA ON A SYSTEM

ASTRONOMICAL DATA

1. From the grid map, select the system you are interested in by using the **Arrow (Cursor)** keys to move it into the middle of the screen where it will be highlighted in green.
2. Use the Data icon **F6** and a schematic summary of all astronomical bodies in the system will appear, if the system has been explored (**Fig 33**).

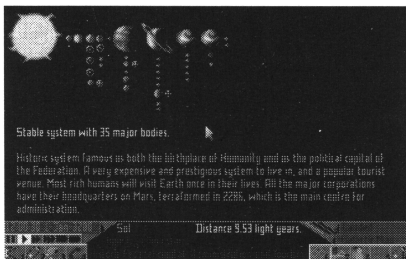


Fig 33: a schematic summary of a system's astronomical bodies

3. Use the mouse to pick out individual bodies on which you require geographical and physical data including:
 - Average surface temperature.
 - Major starports.
 - Orbital period (which is the sidereal period measured in Earth days). Average orbital radius.
 - Orbital eccentricity and inclination, measured relative to the rotational plane of the central body.
4. Clicking away from the text returns you to the general system data. Alternatively click on another body.
5. If you want to return to the grid map of the galaxy, use the Data icon **F6** again or the Galactic Map icon **F2**. ►

► When in Data mode **F6** the icons **F7**, **F8** and **F10** have new functions, as follows:

DATA ON ECONOMY OF SELECTED SYSTEM The Economy icon **F7** gives a breakdown of imports, exports and illegal goods. Exports tend to be cheap and imports expensive.

DATA ON SOCIAL STRUCTURE AND COORDINATES The Political icon **F8** gives relevant details on Government type, economy, allegiance and population. Sector coordinates in the Galactic map are also given here.

CONFIGURATION OF ORBITS OF THE SELECTED SYSTEM While still in System Data mode **F6**, use of the Orbital map icon **F10**, will allow you to see the orbital configuration of the system you selected (**Fig 34**). To alter the viewing angle, press the right-hand mouse button and move the mouse.

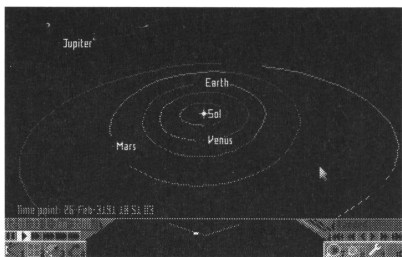


Fig 34: the orbital configuration of a selected system

VIEWING ORBITS WITH RESPECT TO TIME

The orbital map shows a 'snapshot' of the positions of bodies. Select the Forward or Rewind icons on the right-hand side of the screen to predict the positions at different times. The time and date shown at the bottom left-hand side of the screen will change. The real time is displayed underneath it.

VIEWING A SPECIFIC BODY

Click on a body which will then become central on the screen and use the Zoom icons **F7** and **F8**.

MANIPULATING THE SELECTED SYSTEM ORBITAL MAP

Select the Tools icon **F9** and two different icons become available which enable you to adjust the features of the grid.

- The Orbital icon **F9** removes or replaces the orbit lines.
- The Information Text icon **F10** removes or replaces the text on the screen.

To get out of the Orbital map, use the Map icon **F2** to return to the Galactic map.

THE GALACTIC VIEW

This feature can be used to get an idea of perspective. While in Galactic map mode, click on Galactic View icon **F10** and a Creator's eye view of the galaxy is shown (**Fig 35**).

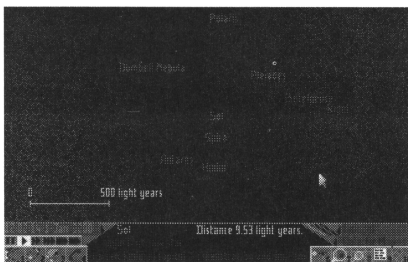


Fig 35: the Galactic View

At maximum zoom (showing 500 light year scale) each pixel represents a single sector. To zoom in and out use the Zoom icons **F7** and **F8** (**Fig 36**). Note that the resolution is best while not zooming. When you stop zooming, improvement of the first, coarse picture is made as quickly as possible by the on-board computer.

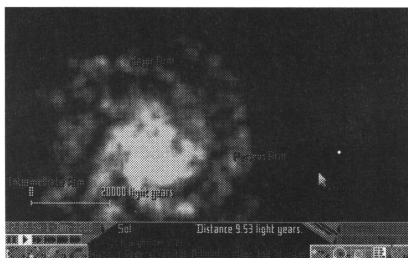


Fig 36: a more remote view of the galaxy

The Galactic Map icon **F10** can be used to return to the Galactic map.

USING THE CURRENT SYSTEM MAP

VIEWING THE CONFIGURATION OF ORBITS

1. Select the Map icon **F2** twice and a map of the system you are currently in is displayed, showing the configuration of the orbits (**Fig 37**).

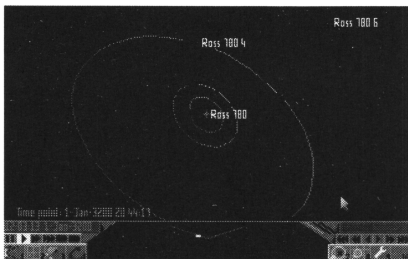


Fig 37: the Current System map

2. Zoom in and out with the Zoom icons **F7** and **F8**.
3. Alter the viewing angle by holding down the right-hand mouse button and moving the mouse as for the Galactic map.

VIEWING ORBITS WITH RESPECT TO TIME

The orbital map shows a 'snapshot' of the positions of bodies. Select the Forward or Rewind icons on the right of the view screen to predict the positions at different times. The time and date shown at the bottom left-hand side of the screen will change. The real time is displayed underneath it.

VIEWING A SPECIFIC BODY

Click on a body which will then become central on the screen and use the Zoom icons **F7** and **F8**.

Note that the Autopilot can be targeted using the Current System map (see the FLIGHT section on page 20).

MANIPULATING THE SYSTEM MAP

Select the Tools icon **F9** and two different icons become available which enable you to adjust certain features of the map.

- The Orbital icon **F9** will remove the orbital paths.
- The Information Text icon **F10** will remove the names of the bodies.

OBTAINING PERMITS

Some systems, such as those with a prison colony, require visitors to have permits in order to enter the system. Any such requirements for a system will be shown on the console when using the Galactic Map.

Permits are not widely available and you will find that they can only be obtained indirectly. This means that you must do business involving the system in question, for example delivering a package, so that the client must give you a permit.

FLIGHT

Your ship has three basic modes of flight: **Autopilot**, **Manual** and **Engines Off** which can be selected by using the Flight Control icons **F7** in View mode. The Autopilot is by far the easiest way to control your craft but does not give you a sense of achievement. Manual flight may take some getting used to, but is more rewarding. Flying with Engines Off does not get you very far, but has some advantages as you will see.

THE AUTOPILOT

This most useful device, although not usually fitted as standard, has been included with your Eagle. It can be bought and fitted at a shipyard if ever you need another one. Your Autopilot, the Robocruise automatic navigation system, superseded the Celestial Pathfinder which was less reliable.

The Autopilot can only be used to select a destination in the system through which you are currently travelling. For longer journeys, a hyperspace jump needs to be made.

OPERATING AUTOPILOT IN VIEW MODE

The Autopilot can only be used when in flight.

1. Whilst in a View mode (use the View icon **F1** if you are in another mode), target a planet or space station which is on the screen by clicking on the centre of the target. Note that you will find it easier to find a target, for example, a city, if the name is on screen. If names have been turned off, select the Identification Text icon **F10**.

Clicking where there is no potential target deselects any previously selected target.

When a target is selected a sight will come up with targeting squares and the range in astronomical units or kilometres (**Fig 38**). If the target goes off the screen an arrow will appear pointing in its direction. If it is behind then **Target Behind** is displayed. ►

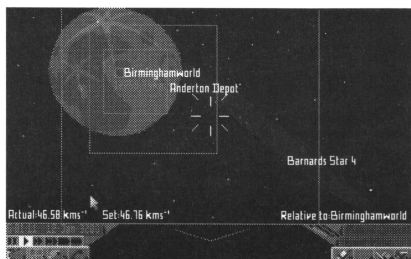


Fig 38: targeting squares show a target is selected

- 2. Use the Flight Control icon **F7** and cycle through **Manual** and **Engines Off** to **Autopilot**.

The Autopilot icon will only appear if a target is selected.

OPERATING AUTOPILOT IN CURRENT SYSTEM MAP MODE

This mode can be used when the desired destination is too far away to be visible. A target can be selected even while landed or docked but the Autopilot can only be engaged while in flight.

1. Use the Map icon **F2** twice to obtain the Current System map.
2. Use the Current System map controls until you can see the desired destination on the screen.
3. Click on the Targeting icon **F10**.
4. Click on the centre of the desired destination (**Fig 39**).

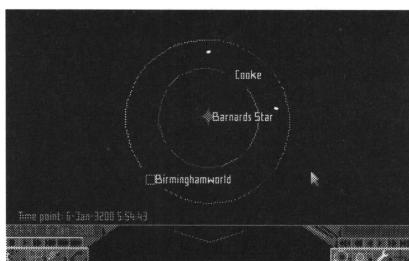


Fig 39: choosing a destination for the Autopilot on the Current System map

5. If you wish to change the target, click on the Targeting icon before selecting another body. Clicking on bodies without selecting the Targeting icon will merely move that body to the centre of the screen.
6. If you wish to deselect the target, click on an area which is blank. This will also disengage the Autopilot if it is currently in control.
7. Return to View mode using the View icon **F1**. Targeting squares, looking like a tunnel leading to the destination, will be visible, if in Front or Rear View.
8. If you are in flight click on the Flight Control Icon **F7** and cycle to **Autopilot** to engage it. To return to Manual flight, use the Flight Control icon **F7** and cycle to **Manual** or **Engines Off**. ►

- The Robocruise will automatically plot and maintain the course to your destination. It will also lower the undercarriage and dock or land for you, having automatically asked for clearance, while you freshen up. Some pilots find it disorientating when the Robocruise engages and swings the ship round. The true Spacehound knows that it is only locking on to the new course.

Remember you can only trade and do business in cities or at space stations. If you do land anywhere else the console will indicate **Landed (Rough)**.

The Robocruise really comes into its own when used in conjunction with the Stardreamer Time Control unit which is fitted as standard on all ships due to regulations regarding Wilbron's psychosis. This condition is known to afflict the space traveller who endures lengthy, uneventful journeys. Boredom becomes so intense after all leisure pursuits have been exhausted that pilots have been known to fly their craft into the odd star or planet just to liven things up a bit.

USING THE STARDREAMER TIME CONTROL

This can be used with the Robocruise or in Manual flight. Use the Time Control icons (after targeting your destination if using the Robocruise) to select the rate of time acceleration. Time appears to increase in steps of ten from ten times to ten thousand times, depending on the icon selected. Return to real time by selecting the single arrow.

Sit back and a combination of a Zilman field and ultrasonic waves induce a semi-hypnotic state which renders you unaware of the passage of time other than seeing the range indicator change rapidly in front of you. This effect was discovered by Dr Rabbne by accident when he realised why his projects were running over time for no apparent reason. Reassuringly, if your ship is attacked or hailed or you have arrived at your destination, the Stardreamer will restore you to full consciousness and real time. Don't forget that your enemies may be operating in real time and hence will seem to be sped up enormously.

HYPERSPACE JUMPS

Space is BIG and hyperspace jumps are necessary to access different systems quickly. Hyperspace jumps can be made using either Standard Hyperdrive or Military Hyperdrive engines which can be bought at the Shipyard and come in different sizes with varying ranges. Refer to APPENDIX ONE: SHIPYARD EQUIPMENT on page 69 for a description of them.

A hyperspace jump causes a disturbance resulting in a glowing field at the entry and exit points. A Hyperspace Cloud Analyser can determine the destination of the jumping ship (see APPENDIX ONE: SHIPYARD EQUIPMENT on page 69). Before attempting your first jump, it is recommended that you read the whole of this section.

RANGE

The range of the jump is determined by two things: fuel and the type and class of engine. Details of these are given in the TRADING section for fuel on page 55 and APPENDIX ONE: SHIPYARD EQUIPMENT for engines on page 74. Briefly the engine's range depends on its class as well as the size of the ship.

Engine ranges are displayed in two ways:

- On the Inventory page select the Inventory icon **F3** until the Ship Equipment appears where the engine's range will be given.
- On the Galactic map (Galactic Map icon **F2**, displayed in the panel, to the right of the system name. If your engine is not up to jumping to the destination selected, the message **Out of Range** will be given.

Fuel range is shown in two ways:

- The amount of fuel required for a jump is displayed at the bottom left of the Galactic map. If you have insufficient fuel then **Insufficient Fuel** will also be displayed otherwise the fuel which will be used will be shown.
- On the Galactic map, a pink circle will surround the system you are currently in and this shows your maximum range for hyperspace in a single jump.

JUMP DURATION

Although the perceived duration of a jump is very short, the actual time is much greater. It takes a week to make the maximum range jump for any engine. For example an engine with a maximum range of 10 light years will take a week to jump that far or 3.5 days for a 5 light year jump, and so on. A ship with a maximum hyperspace jump range of 4 light years will take half a week to jump only 2 light years. This has implications for piracy because a pirate ship with a Hyperspace Cloud Analyser and a lighter ship can 'overtake' you and lie in wait. Contact in Hyperspace is not possible.

HYPERSPACE OPERATION

1. Target a system using the Galactic Map icon, by placing the required destination in the centre of the screen with the **Arrow (Cursor)** keys. That system becomes highlighted in green.
2. Return to View mode using the View icon **F1**.
3. Select the Hyperspace icon **F8** (it will not show if you have no hyperspace facility or a valid jump is not selected) and cross your fingers. If you like you can set your destination, go about your business and be able to make a quick exit at any time if things hot up a bit. Alternatively, if you use the **H** key you can make your jump (**Fig 40**) without going into View mode first.

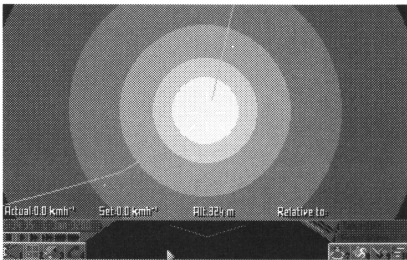


Fig 40: entering hyperspace

Remember that the evidence of your hyperspace jump will be visible to anybody in the vicinity of your exit or entry, as it leaves a glowing area of disturbance in space. The destination can only be ascertained with a Hyperspace Cloud Analyser, available at shipyards. ►

► There are a number of reasons why the Hyperspace icon may not appear, they are as follows:

- You are too close to a planet. Regulations were laid down after the first few decades of hyperspace jumping. Sudden above average recordings of mutations around starports occurred a few years after jumps became routine. It was discovered that the intense radiation caused by the jump was affecting the population below. It became a requirement by law (on all sides) that all ships have a cut-out system built into the Hyperdrive which is activated if you try to jump from near to a planet or space station.
- A valid destination is not selected.
- You do not have enough fuel for a jump to the selected destination.
- Engine is damaged or destroyed.
- You don't have a Hyperdrive engine!

MIS-JUMPS

Hyperdrives almost never go wrong, but if you are unfortunate enough to suffer a spontaneous mis-jump, you can get into serious trouble. You will emerge somewhere other than your planned destination, which may be out of range for your remaining fuel. It is even possible to mis-jump beyond the maximum range of your drive. If indeed your fuel reserves are too low or the Hyperdrive is broken, your only hope is to call for help (Communication icon **F4**) and risk pirates responding. It is not entirely understood why mis-jumps happen but an unserviced Hyperdrive is a likely culprit. There are no reliable statistics available on the occurrences of mis-jumps as most ships are never found. A missing ship could just as easily be the result of piracy.

FORCED MIS-JUMPS

Faulcon De Lacey do not condone this practice as it has an unpredictable effect on the Hyperdrive. It is the equivalent of blindly jamming a screwdriver into the works. We feel that it needs to be mentioned as a warning because foolish pilots do use it as a last resort to escape pirates. If they are being pursued by a larger pirate ship with a Hyperspace Cloud Analyser they force a mis-jump by pressing the **Alt** key while activating the Hyperspace icon or the **F8** key. The pirates follow them into hyperspace only to find that their quarry is nowhere to be seen and is in fact somewhere else, frantically trying to work out exactly where they are. The Hyperspace Cloud Analyser cannot distinguish a mis-jump from a normal jump.

WASTE PRODUCTS

Unfortunately, the convenience of hyperspace travel is blighted with the problem of waste products if you use military fuel. Due to the processes in the Hyperdrive, every tonne of military fuel is converted to one tonne of radioactives which you will need to dispose of on the stockmarket. See APPENDIX TWO: TRADE ITEMS on page 77 for more information. Standard Hyperdrive engines powered by hydrogen fuel do not produce problematic waste products.

USING MANUAL CONTROL

Due to the marked improvement of engineering technology the engines of the craft are not controlled by the pilot directly, but by the on-board computer in response to the pilot. This 'fly by wire' facility has enabled many to take to the cockpit who would not have had the skill to do so.

The main problem for beginners is that they are usually accustomed to driving surface based vehicles in reasonable gravity, or have only used poor quality space flight simulators. What needs to be borne in mind is that when direction is changed, the experience is rather like skidding. If your ship is travelling in one direction, changing course will mean that the nose will turn but you still have momentum in the direction you were originally going. The engines will compensate for this but there is a lag, the duration of which will depend on the type of ship. For example the response rate of a fighter will be faster than that of a heavy cargo ship. This must be borne in mind at all times.

FUEL CONSUMPTION

Normal flight consumes much less fuel than hyperspace jumps and for that reason fuel for this purpose is kept separately in an engine tank from the hyperspace fuel (kept in the hold). Class 1 Engines hold one tonne, and Class 2 Engines hold two tonnes. You do not need to refill very often and the current level can be seen on the green gauge (left-most of three) in the dials area, to the right of the scanner. See INVENTORY ICONS in the ICON section on page 8, and THE SHIP'S INVENTORY in the TRADING section on page 60.

REFILLING THE ENGINE FUEL TANK

Spare fuel for refilling the engine tank is carried in the hold in one tonne units.

1. To refuel the engine tank, select the Inventory icon **F3** until the Ship Equipment page is displayed. (Refuelling is done automatically with the Auto Refueller fitted.)

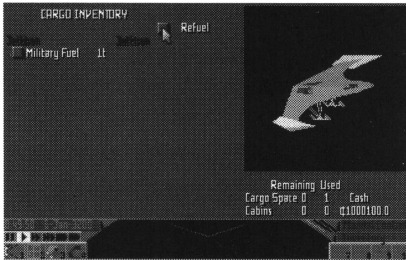


Fig 51: refuelling via the Ship Equipment page

2. Click on the **Refuel** button to transfer the fuel into the engine tank from the hold.
3. If the engine tank only needs one third of a tonne, two thirds will be wasted as the hold tank transfers units of one tonne only.

CONTROLS IN FLIGHT

- **TO MAKE THE SHIP DIVE** Use the **A** key, push the joystick shaft forward or move the mouse forwards while holding down the right-hand mouse button.
- **TO MAKE THE SHIP CLIMB** Use the **Z** key, pull the joystick shaft back or move the mouse backwards while holding down the right-hand mouse button.
- **TO GO LEFT** Use the **<** key, move the joystick left or move the mouse to the left while holding down the right-hand mouse button.
- **TO GO RIGHT** Use the **>** key, move the joystick right or move the mouse to the right while holding down the right-hand mouse button.

Note that when flying with your engines off, the front and rear engines may be controlled using the **Enter** and **Shift** keys respectively.

THE FRONT SCREEN

In Front View mode (see page 3 for a reminder) you will see two crosses on your screen. One is a **gun sight** cross (**Fig 47**) which shows which way you are facing, and the other is a diagonal cross, the **velocity sight** (**Fig 48**) which indicates the direction in which you are travelling. When the two are in line (**Fig 49**) it means that you are moving in the direction you are pointing. If they are separate, it means that your velocity is in the direction of the diagonal cross and you are pointing in the direction of the gun sight because, for example, you have suddenly changed course. You will hear the engines fire until alignment is achieved. You may see the velocity sight disappear when your direction of travel is not within the area of the screen if, for example, you veer wildly and the engines have not yet compensated enough.

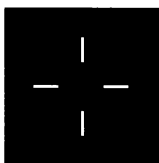


Fig 47: the gun sight

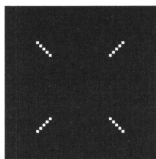


Fig 48: the velocity sight

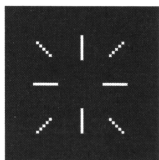


Fig 49: the sights are aligned

To summarise, the gun sight shows the orientation of the ship and is controlled by the pilot; the velocity sight indicates the direction of travel and is controlled by the on-board computer.

Your ship's internal gyros enable it to rotate, much like those in the ancient Earth satellites, good examples of which are now in the space museum in Apollonius City on the Moon. While greatly superior now, the gyros still have a limit to the rate at which you can turn, so don't expect to spin 'on a sixpence' (small coin used in Britain on Earth, about 1,200 years ago).

SPEED

Speed is controlled with the **Return** key to accelerate and the right-hand **Shift** key to decelerate. Two speed values are displayed on the screen: **Set** speed and **Actual** speed (**Fig 50**). The first is the requested speed, set by the keys above and the second is the speed relative to the most important body in your vicinity. This important body can be a planet, star or a space station or very large spaceship, and is selected by the on-board computer. If you fly away from it and the computer then designates another, the actual speed will change, as will the velocity.

You will notice that the velocity sight will move as the on-board computer adjusts your speed relative to the new body. For those who are happy to point your ship at something and go, this is all you need to know. Pilots wishing to be accomplished in flight theory should refer to APPENDIX FOUR: THE MECHANICS OF SPACE FLIGHT on page 91.

ALTITUDE

An altitude reading in metres will be displayed on the screen when in close proximity to a planet or star. It will give your distance above the average ground height of the body (**Fig 50**).

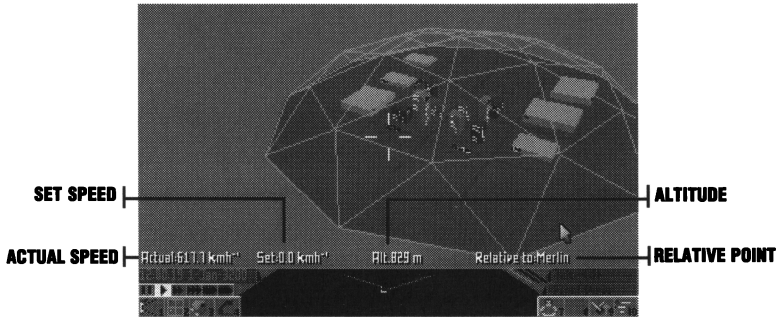


Fig 50: your ship's speed and altitude are shown thus

LAUNCHING

SURFACE TAKE OFF

1. A warning sign is shown over the Take-Off icon if permission to launch has not been granted. If you are landed anywhere other than a starport (**Landed Rough**) you do not need to ask for clearance. If you are in a starport select the Communication icon **F4** followed by **Launch Request**.
2. In View mode, activate the Flight Control icon F7 for take-off. This gives you vertical thrust. The console will display **Take Off**.

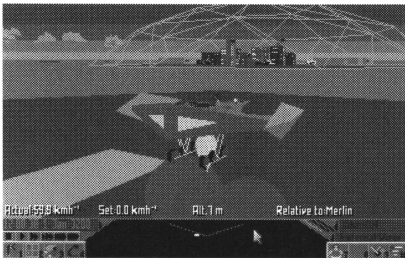


Fig 44: an external view of take off

3. This can seem quite slow so a faster ascent can be made if you tilt the nose up once you have left the ground and increase your **Set** speed with the **Enter** key. Using the rear view will display a pleasing panorama.



Fig 45: a rear view of take off

4. Once you have used forward thrust, the vertical thrust is turned off and the console will display **Manual Control**.
5. Bear in mind that gravity will always pull you back down. If you wish to fly in the atmosphere you must give the ship some lift by pointing the nose up slightly thereby providing a small vertical component to the thrust.

LAUNCH FROM A DOCK

1. Activate the Communication icon **F4** and select **Launch Request**.
2. Accelerate forwards using the **Enter** key.
3. You must leave the area promptly because your clearance expires.

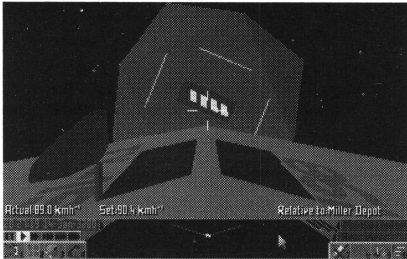


Fig 46: launching from dock

RUNNING WITH ENGINES OFF

If you are economising, turning off the engines has obvious advantages and your engine flares will not be visible to your enemies. It can make manoeuvring easier when strafing a target. For example you can aim to fly across a target and turning off the engines means you can point at it, go sideways and shoot without the engines firing to propel you forward into it. Experienced pilots often use this mode in combat, using the forward and reverse thrusters (**Enter** and **Shift**).

SLING SHOT ORBITS

This technique for gaining speed was important in the early days of space flight, but now it is unnecessary due to advances in space technology. The only reasons to do this are because it can be visually pleasing to sweep past a planet or sun so that you can say you've done it. A sling shot uses to your benefit the gravity of large bodies to 'sling' your ship in the direction of its travel. Your engines need to be turned off otherwise they will compensate for any effect and it saves fuel as well.

LOSS OF ENGINES

If an engine is disabled, the Autopilot will not function properly and only very experienced pilots will be able to fly the ship manually.

LANDING AND DOCKING

LANDING MANUALLY AT A CITY WITH A BREATHABLE ATMOSPHERE (AN OUTDOOR CITY)

Executing a manual landing will require practice, so try it in a relatively safe area. You may find it easier to use External View to align the ship. Remember though that the ship will appear to be stationary and the ground will seem to move. You may also find it helpful to use the targeting squares, obtained by setting your destination as a target (see THE AUTOPILOT section on page 20 or the TARGETING section on page 36).

Normally the Autopilot flies to an area 20km above the target and descends vertically. You can set the controls to Manual flight using the Flight Control icon **F7** at any point in this operation. Alternatively you can fly the entire approach and land manually (**Fig 41**).

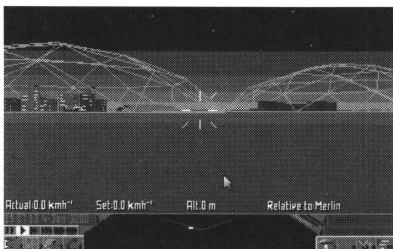


Fig 41: a successful manual landing takes practice

The easiest method is to make a pass over the port while waiting for clearance (Communication icon **F4**) and lowering the undercarriage (Undercarriage icon **F9**). If the undercarriage has not been lowered you will crash-land. When you have been told which landing pad to use, aim to be more or less at zero speed when you come to rest above it. If you select Engines Off, gravity will take you down, with the on board computer stabilising the ship. If there is little or no gravity, you may have to thrust slightly with the nose down to start with, but be careful.

LANDING AT A CITY WITH NO BREATHABLE ATMOSPHERE

Follow the same guide-lines as for an outdoor city with a breathable atmosphere. The only difference is the appearance of the landing area, covered with a hexagonal airlock door (**Fig 42**). When clearance is granted, the aperture will open to reveal the landing pad. Don't ask for permission too early or you will find that the clearance will be withdrawn and the airlock shut. Again, the targeting squares may be helpful by providing a 'tunnel' through which you can fly (see THE AUTOPILOT section on page 20 or the TARGETING section on page 36).

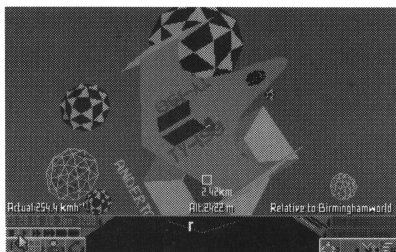


Fig 42: landing at a city with no breathable atmosphere

DOCKING AT A SPACE STATION

Request permission for docking (Communication icon **F4**) and wait until the red flashing light turns white and orange homing lights are visible - it is illegal to approach prematurely. The on-board computer matches your roll with that of the station so you do not have to make difficult calculations in order to dock. Position the ship immediately in front of the docking entrance and proceed in slowly (**Fig 43**). The dock's vehicle arrest mechanism will halt the craft provided your speed is not excessive.●

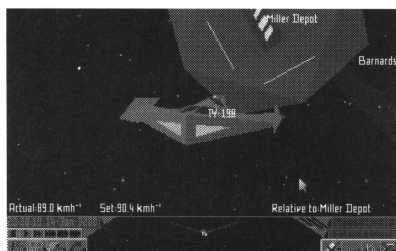


Fig 43: approaching a space station

SECTION THREE

COMBAT

USING YOUR WEAPONS

Welcome to the manual! (in case this is the first page you have turned to).

While Faulcon de Lacy do not condone offensive combat, it is often unavoidable. The best defence is always to run away if at all possible (though many cultures reject this as 'cowardly'). Combat is very dangerous, and rarely ends up without expensive repairs being necessary.

Weapons (like missiles) may be controlled via the Weapon Control Panel of your ship (**Fig 52**) which may be selected by clicking on the scanner area with the left-hand mouse button, or pressing the **F5** key.

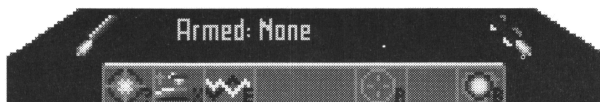


Fig 52: the Weapon Control Panel

This display replaces the scanner display (if fitted). The scanner may be restored by clicking on the area again (away from any icons) or by pressing the **F5** key. It should be borne in mind that keyboard shortcuts to the Weapon Control Panel icons can still be used even if the Control Panel is not currently selected.

As additional weapons and equipment are fitted to your ship, their icons appear along the bottom of the panel. The icon boxes will remain blank until you have obtained the equipment. As you buy missiles and mines, they will be illustrated next to the icon boxes as shown above. It is recommended that you read APPENDIX ONE: SHIPYARD EQUIPMENT on page 69 for more technical information before buying anything.

TARGETING

Targeting is used for both long range navigation (see the NAVIGATION FLIGHT section on page 11) and combat. One target can be set at a time.

1. Using the screen in Front, Rear, External or Turret View mode **F1**, click on the centre of the ship to be targeted.
2. If you are in External or Turret View a sight on the target will appear together with the range (**Fig 53**). ►

► 3. If you are in Front or Rear View you will be presented with the Targeting Tunnel on your headup display (**Fig 54**). This is displayed as a series of contracting squares along the path to the target, and looks like a tunnel. The range of the target is given in Astronomical Units **AU** or kilometres **km**. Targeting Tunnels are not normally shown for ships as they can be confusing. They may be enabled by using the 'Preferences'.

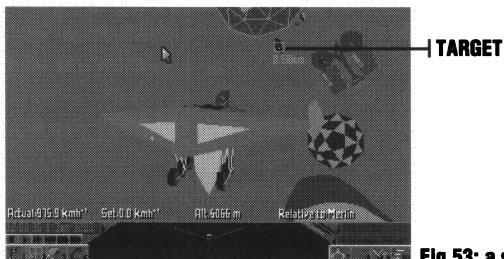


Fig 53: a ship is targeted in External View

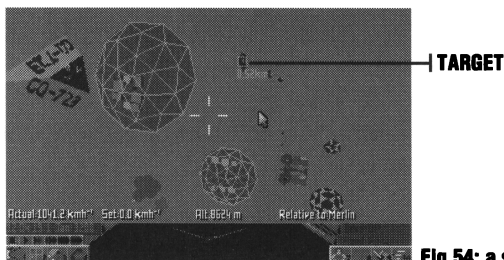


Fig 54: a ship is targeted in Front View

4. In order to pursue the ship you fly down the tunnel. As you get closer to the target the squares will be shown closer together, thus the squares will come towards you faster. If you are approaching a stationary target then ideally the squares should pass at a constant rate, as you slow down on the final approach.
5. If the target goes off the screen, an arrow will indicate the direction in which it lies, or, if it is behind your ship, **Target Behind** will show.
6. To deselect the target, click on a blank area that is not a potential target.
7. You may also select another target at any time by clicking on another object.

Some pilots may find the 'tunnel' an annoyance. If you are one of these refer to the Preferences sheet supplied separately from this manual.

OFFENSIVE WEAPONS

Quite often, the best form of defence is attack, hence Faulcon de Lacy do provide what may be considered offensive weapons. It should be made clear that they should only be used in a defensive capacity against an attacker - Faulcon de Lacy in no way condone any other use.

PULSE LASERS AND BEAM LASERS

One laser (or other gun) can be mounted at the front of your ship and, for ships with a rear mounting, one at the rear. Some larger ships are fitted with turrets, which can each take a single weapon. There is a wide range to choose from (see APPENDIX ONE: SHIPYARD EQUIPMENT section on page 69), though the full range will only be available at the biggest shipyards. It is rumoured that the military of both sides have developed additional weapons for their own use, but this is usually denied.

A Pulse Laser fires a single high energy pulse about once every $\frac{5}{8}$ of a second, while a Beam Laser fires a continuous beam, so is far more devastating. Even small lasers are reasonably effective up to 8km range, but their effectiveness decreases with distance, as the beam spreads slightly. It is recommended that you get your shots in at as short a range as possible, for maximum efficiency.

Beware of laser reflections from certain types of surface, especially when at a glancing angle. Though the beam may have lost much of its energy it can still cause serious damage. There are also words that the Imperial Navy are developing reflective armour, which reflects much of a laser's energy back along the incoming path, though this is strongly denied.

OPERATING PULSE OR BEAM LASERS

Lasers are fired by pressing both mouse buttons together, the **Spacebar** on the keyboard or the fire button on the joystick. The front mounted laser will fire if you are in Front View mode **F1**, the rear laser if in Rear View mode, and the appropriate turret laser if in a Turret View mode. If you are in External View, then the front laser will be used, irrespective of any other lasers fitted.

It is quite common for lasers to overheat, particularly with more excitable pilots and with the higher power beam lasers. It is unlikely you will do your laser any damage by this as it is protected by an automatic cut-out to prevent it burning out, but it may stop working for a few seconds.

LASER COOLING BOOSTER

This reduces the problem of lasers overheating at that vital moment. It supplements the built-in cooling system of your currently selected laser, causing it to cool more rapidly. It does not affect Plasma Accelerators.

USING MISSILES

If you want a quiet life, be careful who or what you use as target practice. When the time comes to use one of these devices, proceed as follows:

1. Arm the missile of your choice by clicking on one of the missile icons. The console will show the type of missile or mine you have armed. You can arm only one missile at a time, so if you click again on a different missile, you will be arming that one and disarming the previous one.
2. A **FIRE** icon also appears. Clicking on this or pressing the **M** key on the keyboard fires the armed missile at your target, but it is important to remember that you can only fire if a target has been selected.



Fig 55: ready to FIRE with a target selected

3. Disarming is simply achieved by clicking on the missile in question or clicking on an another weapon.

All types of missile will home in on their selected target as rapidly as their incredible 65g acceleration ZX34 Short-Burn engine will allow. Nevertheless they have limited fuel (enough for about one minute of flight) so pilots do sometimes evade them. It is best to fire the missile from as close to the target as you dare, ideally while facing it. If the target is behind, the missile will turn around, but this will waste precious flight time, and give the target ship more time to use ECM if it has it. ►

► The missile will detonate on hitting any solid object (including the ship that fired it) but will attempt to avoid such non-target objects if possible. It does not need to hit the target in order to detonate - it may detonate in close proximity and do almost as much damage. Due to an international treaty it will also detonate when it runs out of fuel. A small village was once destroyed by a missile which had been flying through space for months, following the battle in which it was fired.

USING MINES

Mines operate just like missiles, but without drive systems. They need to have an assigned target since they also will detonate in the proximity of that target without necessarily hitting it. Mines are also susceptible to detonation by ECM. Dummy Mines are a relatively recent innovation, and still contain machinery internally in order to fool radar scans, hence their weight. They are also visually indistinguishable from normal mines so, although they are safe to scoop back up again, beware of accidentally scooping a live mine instead, as the scoop mechanism will cause it to detonate.

ENERGY BOMB

Generally only of use against smaller ships. This causes the main reactors of all small ships' drive systems (within a range of about 100km) to resonate and overload. It is linked to the drive of the ship using it, so will not cause that to detonate. Operated with the Energy Bomb icon (**Fig 56**) on the Weapon Control Panel, or from the keyboard with the **B** key.



Fig 56: the Energy Bomb Icon

LARGE AND SMALL PLASMA ACCELERATORS

These are very large weapons, usually carried by large naval cruisers and battlestations, and are sometimes carried by large trading ships and passenger liners in the more dangerous regions of space. They are used in the same way as lasers and take up a gun mounting. After firing, they take a few seconds to recharge. Two sizes are commonly available, imaginatively named 'Large' and 'Small'. Even a Small Plasma Accelerator will destroy a well armed hundred tonne ship with a single shot. The large version has been known to be used as a planetary assault weapon, destroying selected areas of cities from orbit. This has a devastating effect on the local population, because the terrifying noise of the beam cutting through the atmosphere can be heard for hundreds of kilometres, and will deafen anyone unprotected in the vicinity.

DEFENSIVE AND OTHER EQUIPMENT

ECM SYSTEM

This destroys all active Mines and Homing Missiles in the vicinity (within about 100km). It is operated with the ECM icon from the Weapon Control Panel, or with the **E** key from the keyboard. Do not be alarmed if it causes interference on your main display.



Fig 57: the ECM icon



Fig 58: the ECM is active

NAVAL ECM SYSTEM

A superior version of the standard ECM system, which can also destroy Smart Missiles, and has a greater range (about 200km). This may also cause interference on your main display. This is operated with the Naval ECM icon from the Weapon Control Panel, or with the **E** key. If both ECM systems are fitted, then Naval ECM is used in preference. The only slight advantage in having both systems fitted is that if the Naval ECM breaks down or is destroyed, then you can use the standard unit.



Fig 59: the Naval ECM icon

AUTOMATIC HULL SEALING

All hulls have an automatic sealing system, fitted as standard, thanks to Faulcon Hermeseal. It is comprised of two separate layers of resin under high pressure in the hull. When the layers are breached the substances expand and mix to form a very durable foam-like patch. This prevents the whole hull being explosively decompressed from a single shot.

HULL AUTOMATIC REPAIR SYSTEM

This gradually completely reverses hull damage, but it is so big that only larger ships can have one fitted. See APPENDIX ONE: SHIPYARD EQUIPMENT section on page 73.

SHIELD GENERATOR

This will protect against energetic weapons like lasers and missiles. It is not much good with collisions. If a ship that has a Shield Generator is hit by a weapon, the field will glow in a colour depending on the strength of the shield. At full charge, the field will glow a bluish white but will progress through to yellow, orange and finally red as it is discharged. While the shield is active, no damage will get through to the hull. If your ship has shields, they work automatically and the percentage of the charge remaining, if not 100 per cent, will be indicated on the top left of the screen. More than one Shield Generator may be fitted to a ship at once, and their shielding effect is additive.

ENERGY BOOSTER UNIT

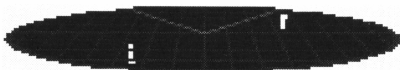
This large unit increases the rate that all Shield Generators currently fitted to your ship recharge. Only recommended for larger ships with a large number of Shield Generators, because of its size.

TACTICS AND PLANNING

It is vital to know what your enemy is up to, so you can avoid getting into combat with them. There are several different ways of doing this.

CHECKING UP ON THE COMPETITION

USING THE SCANNER This device, usually provided as standard by Faulcon de Lacy, shows the relative positions of ships and other objects in your vicinity. The holographic display shows the other objects as coloured blobs above or below the plane of your ship, with a coloured line drawn to that plane. The plane of your ship is shown as a red circle with a grid on it (seen in perspective when viewed from the pilot's seat), with two lines drawn on it to show the extremity of your front view. The colour of the blob reflects the mass of the ship or object.



BLUE	1-15t	ORANGE	112-159t
GREEN	16-31t	YELLOW	160-207t
MAGENTA	32-63t	GREY	208-299t
RED	64-111t	WHITE	300t +

USING THE RADAR MAPPER This provides you with additional information about your current target, such as the number of Shield Generators it has fitted, their current charge level, the ship's maximum hyperspace range and any important equipment such as Energy Bombs and Hyperspace Cloud Analyser. It will also check if the ship matches any on the Wanted Criminals list, and if so will show any bounty that is offered. This bounty will be paid into your account automatically, when the destruction of the ship is recorded by your on-board computer. No bounty will be paid for a ship if the Radar Mapper has not first identified it, since proof of identity is needed. To operate the Radar Mapper:

1. Make sure you are in View mode by using the View icon **F1**.
2. Target a ship by clicking on it using the left-hand mouse button. If the selected target is not a ship then no information will be shown.
3. Select the Radar Mapper icon (**Fig 60**) on the Weapons Control Panel and information will be displayed at the top right of the headup display (**Fig 61**) on your target until the Radar Mapper is deselected.



Fig 60: the Radar Mapper icon



Fig 61: the Radar Mapper in use

4. To deselect this facility, use the icon again.
5. To deselect the target, click away from the ship where there is no potential target.

USING THE HYPERSPACE CLOUD ANALYSER This device is commonly used by pirates to identify the destination of their quarry, and also by police forces and bounty hunters. If your ship has a greater hyperspace range than the one you are chasing (use the Radar Mapper and your Ship Equipment Inventory page to determine this), then you will arrive at the destination before them if you left at the same time. ►

► It gives their hyperspace destination, the ship's mass is also shown and the exact Galactic Mean Time and date at which they will arrive.

1. Make sure you are in View mode by using the View icon **F1**.
2. Target a hyperspace remnant by clicking on it using the left-hand mouse button. If the selected target is not a hyperspace remnant then no information will be shown.
3. Select the Hyperspace Cloud Analyser icon (**Fig 62**) on the Weapons Control Panel and information will be displayed at the top right-hand corner of the headup display until the Hyperspace Cloud Analyser is deselected.



Fig 62: the Hyperspace Cloud Analyser icon

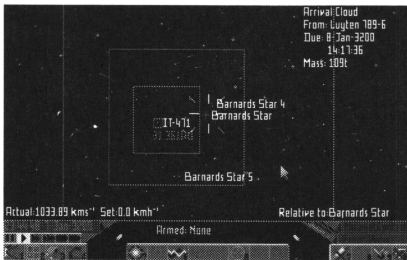


Fig 63: hyperspace cloud information is shown

4. To deselect this facility, use the icon again.
5. To deselect the target, click away from the ship where there is no potential target.
6. To follow the ship, use the Galactic Map icon **F2** to jump to the same destination (see the NAVIGATION AND FLIGHT section on page 11). As long as you enter hyperspace not too long after your quarry then you will leave hyperspace at a similar position.
7. Once out of hyperspace, use the Stardreamer Time Control (see the NAVIGATION AND FLIGHT section on page 22) to wait until the likely time of arrival of your quarry. The Hyperspace Cloud Analyser information is quite accurate, so if the predicted time has been exceeded by about a minute, then your quarry will not arrive. They must have mis-jumped (whether intentionally or not) and there is no way you can find them.

BROADCASTING MESSAGES

While in flight you can hail other ships using the Communication icon **F4**. A range of messages for broadcasting will be presented on your headup display (**Fig 64**). For example, you can demand surrender if you are fortunate enough to be in such a position. If your ship is on the receiving end of aggression you can call for assistance, but there is a risk. Some pirates listen for a call of distress and will home in on it like a spider to a fly. If you have broken down the dilemma is the same, but calling for help may be the only option open to you.

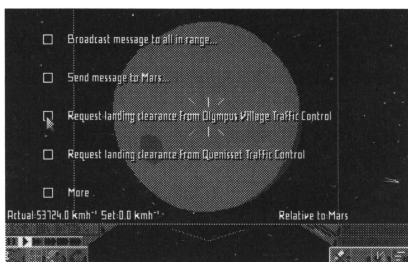


Fig 64: choose a message to broadcast

MAKING A RUN FOR IT

You will discover that there are many bigger and more heavily armed ships than yours and a ship to ship fight may be foolish. Faulcon De Lacey do not advocate illegal evasive measures and feel that going down in a blaze of glory is more memorable for your loved one than a prison sentence. If posthumous praise is not appealing, an escape capsule could be your answer.

ESCAPE CAPSULES An escape capsule is not fitted as standard and needs to be obtained from the Shipyard. It is not a capsule as such but is a modification that allows your cockpit section to break off as a separate craft, unfortunately leaving any crew members, passengers and cargo behind. It flies to the nearest starport under a cut down Autopilot, and can be used only once. For this reason, it comes with an insurance policy which is automatically cashed in for a basic Eagle Long Range Fighter to replace your abandoned ship. ►

► The capsule has no weapons or hyperspace facility. You may ask why your enemy isn't going to shoot at you. It is considered to be extremely bad form to shoot at escape capsules because they are much too easy a target, and most pilots realise that some day they may need to use one. It has been known though, that some pilots are not bothered by image and will pick you off anyway. Another problem is ships scooping up escape capsules and selling the occupant into slavery. This is severely frowned upon by both the Elite Federation of Pilots and the Federation itself. To release the capsule, you select the Escape Capsule icon on the Weapons Control Panel, or use the **X** key on the keyboard.



Fig 65: the escape capsule icon

HYPERSPACE Jumping into hyperspace is often sufficient to evade pirates, but a pirate with a fast ship may use their Hyperspace Cloud Analyser to chase you into hyperspace and, if they have a faster ship, may even arrive at your destination before you do.

ILLEGAL AND RISKY PRACTICES You may notice others committing offences in order to remain alive and we feel compelled to explain their erroneous behaviour in order to discourage you from copying them. One tactic is the highly risky Hyperspace Mis-jump and this can be found in the **NAVIGATION AND FLIGHT** section on page 25. Another is to jettison cargo in the hope that any ship following will give up the chase in order to scoop it up. This is explained in the **TRADE** section on page 59. Remember - it is illegal to jettison any cargo.

COMBAT AND SERVICE RATINGS

ELITE RATING

Your rating as a pilot is displayed if you use the Inventory icon **F3**, and cycle through to Commander Profile (**Fig 66**).

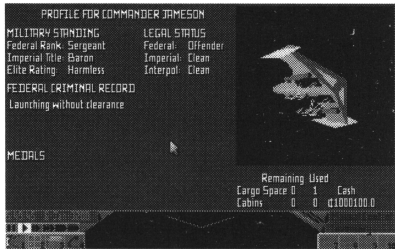


Fig 66: the Commander Profile shows a pilot's status

You are given a rating by the Elite Federation of Pilots which is calculated from the number and type of kills recorded by the on-board computer. For example, shooting up a heavily armed ship will amass a large number of points. Many have disapproved of using kills in order to calculate this rating as it can lead to illegality. In older times much store was set by this as you had to be able to fight to survive, so shooting down others was seen as a mark of skill and bravery. Great respect is still held for the rating in the outer systems, where the way of life still reflects that of the past of the inner, now more civilised, systems. For historical reasons therefore, the method of rating has been preserved. The categories are as follows, in order of merit:

ELITE RATINGS

Harmless	Above Average
Mostly Harmless	Competent
Poor	Dangerous
Below Average	Deadly
Average	ELITE

MEDALS

If homicide is not your scene, medals are awarded by the Federation or the Empire for particularly heroic deeds. Medals include the humble Certificate of Valour and the highly respected Imperial Celestial Warrior medal. These are also shown on the Commander Profile page of the Inventory.

MILITARY RANK

Both the Federation and the Empire give military ranks for services rendered, although these are known as titles in the Empire. An individual can gradually progress up the ranks even from purely mercenary missions, receiving promotions after sustained loyal service. Usually these ranks are mutually exclusive as each of the superpowers does not tolerate its officers working for the other power (though work for the independent worlds is usually allowed).

FEDERAL RANKS

None	Lieutenant
Private	Lieutenant Commander
Corporal	Captain
Sergeant	Commodore
Sergeant-Major	Rear Admiral
Major	Admiral
Colonel	

IMPERIAL TITLES

Outsider	Viscount
Serf	Count
Master	Earl
Sir	Marquis
Squire	Duke
Lord	Prince
Baron	

LEGAL RATING

Before you start shooting at everything that moves in order to improve your rating, consider your legal status. Data is collected by the three police forces: The Federal Security Service (of the Federation), the Imperial Guard (of the Empire) and Interpol (that of the Independent Systems). The latter was set up after the Federation and Empire became established as superpowers, and the world leaders that wished to remain free of both got together and decided to set up their own police force. This was largely to avoid the independent worlds becoming a dumping ground for criminals. Remember, what you do and who you work for will almost certainly be noticed by someone.●

SECTION FOUR

THE SHIPYARD

SHOPPING FOR SHIPS AND PARTS

The shipyard on any planet or station is where you can contact the police to pay any outstanding fines or buy equipment for your ship, have parts fitted and removed, repairs made or even part exchange your ship. The range on offer depends where you are, so you may have to shop around. For example a low population area is not going to have a vast selection of hardware for your ship. Having used the Communications icon **F4**, select **Shipyards** and you will be presented with a list of services (Fig 67).

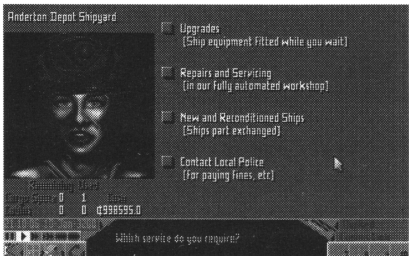


Fig 67: the list of Shipyards services

UPGRADING THE SHIP OR REMOVING PARTS FOR CASH

1. Click on **Upgrades**. The screen will show items for sale with options to **Fit** or **Remove** them and the prices for doing so (Fig 68).

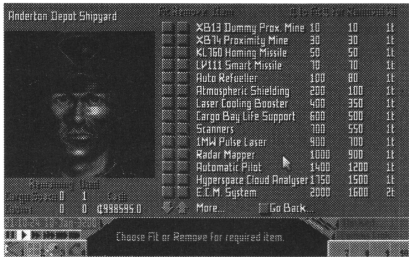


Fig 68: fitting or removing equipment

2. Select **Fit** or **Remove** buttons for the item of interest, and your cash total at the bottom left of the screen will change accordingly.
3. If the complete list of available items is too long to be shown in its entirety, use the **More...** arrows to look through it.
4. Use of the **Go Back...** button will return you to the Shipyards and the Communications icon **F4** will return you to the Services list. Equipment is fitted or removed while you wait and the process is fully automated.

NOTE FOR FITTING GUNS

For guns, if your ship has more than one mounting you will be asked where you want the gun fitted. Old campaigners may recall that left and right mounts were once available, but this was outlawed after so many people found that they were accidentally shooting down their friends or, more embarrassingly, the police, due to the impracticality of using them.

DECIDING WHAT TO BUY OR REMOVE

Each ship has only so much space in the hull and out of this, room has to be made for the engine, guns, fuel, cabins, cargo and so on. The proportion that these items take up depends on your needs, for example a fast courier ship’s engine will dominate the hull.

Alternatively, if you are interested in having a more deadly ship than a fast one, engine size can be sacrificed for weapons. All items are rated for weight which is equivalent to the space they occupy, any space left can be used for cargo. If a particular shipyard does not sell a piece of equipment, repairs or removal cannot be carried out because the tools required will not be available either.

SHIP’S EQUIPMENT INVENTORY

A list of the equipment on board can be obtained by using the Inventory icons **F3**. Cycle through the pages until you find **Ship Equipment Status**. The picture of your craft will show any externally visible items.

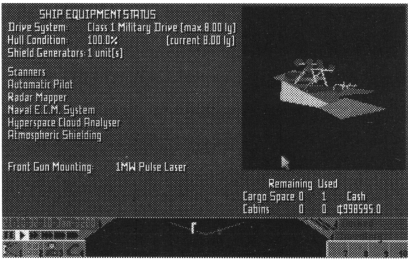


Fig 69: your ship equipment status

REPAIRS, SERVICING AND BREAKDOWNS

Equipment is usually very reliable but will become more unreliable with age, so servicing is important. It can be done at any time, and the longer you leave it the more likely a problem is to occur, so delay at your peril. Shipyards vary in the service they give, so you may find that your ship suffers from poorly fitted parts and shoddy repairs. If an item of equipment breaks down it will not function and will be shown on the Ship's inventory page (Inventory icon **F3**) in faded text until it has been repaired. If a particular shipyard does not sell a piece of equipment, repairs cannot be carried out because the tools required will not be available either.

Having a piece of equipment repaired or serviced:

1. Select the Communications icon **F4**.
2. From the list choose **Shipyards** followed by **Repairs and Servicing**.
3. You will be presented with a list of servicing options.

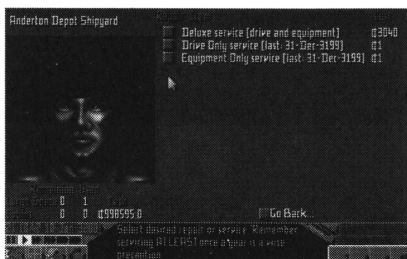


Fig 70: a list of equipment for repair or service

NEW AND RECONDITIONED SHIP HULLS

This mode allows you to part exchange your ship for another. It is standard procedure to strip a ship of its extras before selling it, as the only optional item which affects your trade-in value is the Hyperdrive. New ships come with 1t of the appropriate fuel in the internal tank, whatever the size of the tank.

1. Via the Communications icon **F4** select **Shipyards** followed by **New and Reconditioned Ship Hulls**.
2. The ships on offer will be listed with sale details.
3. You may elect to **Buy** or to **View** the ship first. Note that the types of ship on offer in a system will differ according to political allegiance, population and types of visitor. ►

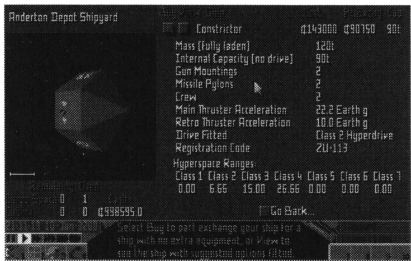


Fig 71: view a ship before you decide to buy

4. Additional ship information is provided when selecting **View** including mountings, crew and hyperspace range.

TAKING ON CREW MEMBERS

When you buy a larger ship, it may require extra crew in order to fly it. Without them, it will not be able to take off. It is not necessary to buy extra cabins because they come with the ship if it needs multiple personnel. You must hire the crew members through the Bulletin Board using the Communication icon **F4** (see the TRADING section on page 61). When they are hired, a page called **Crew Roster** appears in the inventory mode (Inventory icon **F3**, see the ICONS section on page 8), and will list all crew members. You can also fire them using this page, but only when you are in dock.

Crew members will cost you - the fun of the ride isn't enough. Wages will be deducted by direct debit from your bank account. Wages are sometimes negotiable but are generally quite high because there is a certain amount of danger for crew members. For example, should you decide that you need to use your escape capsule, the crew are left behind. Remember, you get what you pay for.●

SECTION FIVE

TRADING

BUY! SELL!

Trading is a simple process thanks to an agreement between the Empire and the Federation that allows free trade within all systems via the stockmarkets. After all, the cold war has to be supplied and fuelled by something. There are also private markets which may be more lucrative, but are sometimes risky. Each will be explained in turn.

TRADING ON THE STOCKMARKET

You need to go to a city or space station in order to trade on the stockmarket. You cannot trade in flight but at least you will be safe whilst trading.

1. Select the Communication icon **F4** at the bottom of your console, and a list of options will appear.
2. Select **Stockmarket** from the menu, and you will be presented with a selection of items (**Fig 72**). Click on the down **More...** arrow and any remainder of the list will be given.

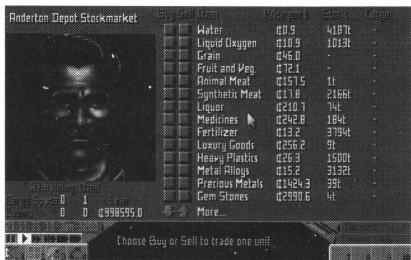


Fig 72: the stockmarket

3. The screen displays **Buy** and **Sell** buttons, price per tonne, stock on the market and the amount of cargo (in tonnes) that you have at present in your hold.
4. Before trading read the information on the items below. Note that only legal items will be listed. For illegal goods you will have to use the private market (see THE BULLETIN BOARD section on page 61).

BUYING

1. To buy one tonne of a chosen item, activate the button corresponding to the item of your choice in the **Buy** column. Your console will show the item you have selected. One click will auto-load one tonne into your hold. Holding down the button will buy multiple tonnes at an accelerating rate. ▶

- 2. If you want to revise your transaction, the **Sell** button will subtract from your stock. There is no charge for changing your mind during trade but you must make a decision reasonably quickly.

UNSUCCESSFUL TRANSACTIONS

You will be unsuccessful if:

- Your cargo hold is full (indicated at the bottom left of the screen under **Cargo Space**). See also THE SHIP'S INVENTORY section on page 60.
- You have insufficient money (indicated at the bottom left of the screen under **Cash**).
- The stock is not available.

Information on all situations will be displayed on your console.

SELLING

1. This is a similar operation to buying, but using the **Sell** button. Your stock level will be automatically decreased as you sell. A mistake can be changed using the **Buy** button, for which there is no charge but if you delay too long, someone else may buy first.
2. You will be unsuccessful if your own stock runs out, which will be shown on your console. See also THE SHIP'S INVENTORY section on page 60.

STOCK AND PRICES

The stock level indicated on the console is that on the stockmarket, not the private market which has its own separate holding. Prices are brought to you by Zebulon Intergalactic Trading Corporation (ZITCO), and are updated each midnight Galactic Mean Time (GMT). Galactic time was adopted after the signing of the treaty between the Empire and the Federation. Hostilities between them cannot be conducted if one party does not turn up because they have calculated the time incorrectly. If the stock level falls due to demand, the local price may rise. If a ship arrives with a large cargo of grain, say, when it sells this onto the market, the price of grain may fall at the next midnight price adjustment.

TRADING AND THE STARDREAMER TIME CONTROL

Prices are changed every midnight which may be a bit frustrating if you are in a hurry. Use of the Time Control icons activates the Stardreamer which will appear to speed up time. There is a description of this device in the NAVIGATION AND FLIGHT section on page 22. Remember that your enemies are also going to be sped up so only use this when it is safe to do so, though even on an open-air station, you will be protected by the station's own defences. Remember also that the station makes a small charge every midnight for your stay.

CHOOSING WHAT TO TRADE

Systems all have their own production and consumption, imports and exports. Generally the price of imports will be higher than the Galactic average and that of exports lower than average. For example a farming area will have cheap grain, so it will be a good place to buy in order to sell to an area that has no grain production.

A listing of imports and exports for a given system can be found by using the Data icon **F6** (see the NAVIGATION AND FLIGHT section on page 15). Information on illegal goods will also be found there.

CHOOSING WHERE TO TRADE

The Galactic Map (Galactic Map icon **F2**) shows a number of recommended trade routes (lined in pink) updated by ZITCO in 3195. Faulcon De Lacey take no responsibility for any inaccuracies for this reason. A map with the trade routes has also been supplied with this manual.

It is always worth looking at the political and economical details of a system before possibly wasting fuel (see the NAVIGATION AND FLIGHT section on page 15). Items that are in abundance in a star system will be relatively cheap to buy. Conversely, items that are in short supply will be more expensive and worth selling there.

CASH

Your funds are indicated under **Cash** at the bottom left-hand corner of the screen. They are safe if your ship is destroyed thanks to an automatic banking system. If you run out of cash you could sell your ship for a smaller one or sell off a piece of equipment. It may be worth looking for offers of insurance from the Bulletin Board.

JETTISONING AND SALVAGING GOODS

This is an illegal practice but is occasionally necessary. Certain goods are damaged by this act and this needs to be taken into consideration when salvaging such cargo.

The following changes will occur:

- Live animals will become animal meat.
- Slaves die and are officially used as fertilizer but rumour has it that the bodies are finding their way onto the animal meat market.
- Liquor, luxury goods, grain, fruit and vegetables are all turned into rubbish.
- Sometimes containers will explode unpredictably when released due to irregularities introduced during their manufacture.

JETTISONING

Select the Inventory icon **F3** and cycle to the **Cargo Inventory** section, which displays jettison buttons (**Fig 73**). Activate the button next to the goods which will be ditched one tonne at a time.

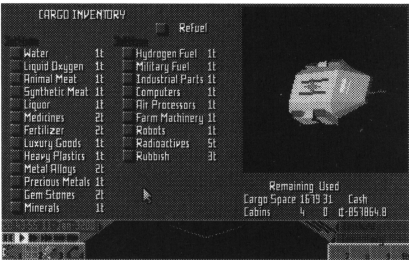


Fig 73: Jettison your cargo from the Cargo Inventory

SALVAGING

You cannot salvage jettisoned goods unless you have bought a Fuel Scoop and a Cargo Scoop Conversion. If you have such equipment, manoeuvre so that the cargo item is immediately in front of the scoop and move forwards slowly relative to it.

SHIP'S INVENTORY

This gives a more detailed account of your cargo and passengers, and is obtained by using the Inventory icon **F3**. Clicking on this icon cycles through seven pages of information for your perusal including:



SHIP EQUIPMENT STATUS Lists weapons and equipment currently fitted to the ship. See the SHIPYARD section on page 51 for details of individual items. It also shows the level of fuel in the engines which is distinct from the hyperspace fuel (see FUEL CONSUMPTION in the NAVIGATION AND FLIGHT section on page 26).



COMMANDER PROFILE Lists awards and grading. See the COMBAT section on page 47.



CREW ROSTER Lists any crew members (on larger ships only). See the SHIPYARD section on page 53.



CARGO INVENTORY Your cargo is listed if you have any. Jettison one tonne of any item by clicking on the relevant button.



PASSENGER AND SMALL ITEMS This lists the names of your passengers or clients, the number of persons on board, any small packages and the destination and how much money you are still owed from the deal.



OUTSTANDING CONTRACTS LIST This shows contracts taken on but not yet completed. Those which involve carrying parcels and passengers are listed on the **Passenger And Small Items** page.



MINING INSTALLATIONS Lists the locations of all active mining installations owned. See the MINING section on page 65.

Note: the pages will not be shown if there is nothing on them.

THE BULLETIN BOARD

This is a collection of small advertisements for trading, services and requests for passage, amongst other things. You will find other types of advertisements so it is worth a browse. It is also possible to contact the military, its allegiance depending on the system you are in.

TRADE IN LEGAL ITEMS

Some individuals trade on the Bulletin Board in preference to the Stockmarket, and taking a risk with them may benefit you. There may be ads for specific items which a person needs urgently that cannot be bought on the Stockmarket, so they are prepared to pay over the odds for them. You may earn more money this way than simply selling directly on to the Stockmarket.

1. Select the Communications icon **F4**.
2. Select **Bulletin Board** and look for advertisements stating **WANTED** (Fig 74).

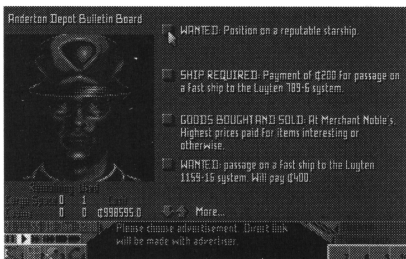


Fig 74: Wanted ads are often worthy of attention

TRADE IN ILLEGAL ITEMS

Of course being a law abiding citizen you will not be engaging in this, but in order to understand the criminal mind better you ought to know the typical procedure.

1. Select the Communication icon **F4**.
2. Select **Bulletin Board** and look for advertisements stating **Goods Bought and Sold**. Though there may not be any in a particular place or that day. The **More...** arrows will allow viewing of the ads which on a given day don't fit on the screen ►

- 3. Click on the button for the **Goods Bought and Sold** advertisement you are interested in and a list will appear of all the illegal goods available.

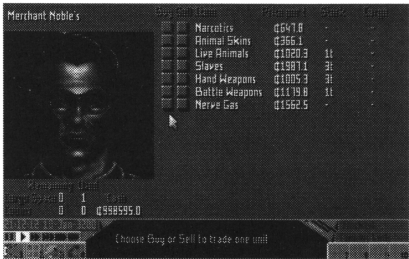


Fig 75: use the Bulletin Board for Illegal trade

4. Trade in a similar way to the stockmarket.

The police, although aware of this practice, will not shut it down. Not only do they take a cut in profits but they often use it to their advantage. Traps are laid in the form of advertisements and the astute criminal will get to know their characteristics. Once successful trading has taken place, there is always the threat of customs officials, not that you will ever have anything to hide of course.

CARRYING PASSENGERS

People may place ads asking for passage for themselves or a group to a stated destination. If you want to do this, you need sufficient cabin space on your ship, which may mean extra outlay for you. See THE SHIPYARD section on page 50, where upgrading your ship is explained.

TAKING UP A REQUEST

1. On the bulletin board via the Communication icon **F4**, look for the appropriate advert and select it (**Fig 76**). ►

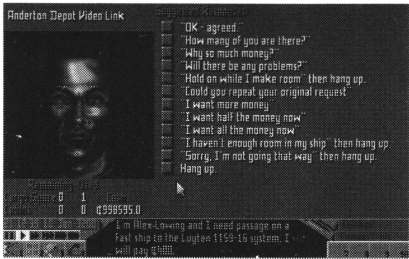


Fig 76: taking on passengers via the Bulletin Board

- ▶ 2. Choose one of the responses presented to you, for example one response might ask why they are prepared to pay so much.
- 3. The answer comes up on the console at the bottom.
- 4. If you want to make a deal, click on **"OK - agreed."** at the top of the list of responses.
- 5. The passengers will appear on your passenger list.
- 6. Payment is normally made on arrival at your clients' destination, although some will pay half up front or even all!

CARRYING PACKAGES

To act as a courier, negotiate in the same way as for passengers after finding adverts for transporting packages. A package is deemed to take up negligible space in your cargo hold and of course does not need a life support system.

TAKING ON CREW

If you ever buy a larger ship, it may require extra crew which are also obtained through the Bulletin Board small advertisements. More details about your contract with them can be found under **TAKING ON CREW MEMBERS** in **THE SHIPYARD** section on page 53.●

SECTION SIX

MINING

THERE'S GOLD IN THEM THAR HILLS!

If you prefer a solitary life, then mining is for you. This occupation entails travelling from place to place collecting ore. There are two types of mining: Asteroid Mining and Surface Mining, both have their merits and drawbacks.

ASTEROID MINING

Asteroid mining is an old method but it is tried and tested. It is the easiest and cheapest way of obtaining ore and requires you to have a 30MW Mining Laser, Fuel Scoop and a Cargo Scoop Conversion. You simply blast an asteroid with the laser then fly over the bits of asteroid and the Scoop collects as much ore as you can accommodate in the cargo bay. Not all asteroids are mineral rich though, so you may end up with a bay full of rubbish.

SURFACE MINING

Once you are established, this type of mining is a more predictable means of getting ore. It does, however, demand a large initial outlay in order to acquire the installations and possibly a larger ship (minimum of 30 tonnes of free cargo space) to transport them. The only recommended device is the MB4 Mining Machine which, alas, is still not widely available. The MB4 is impressive in that it not only mines but also refines the material, so you put it in place, leave it and come back to pick up the results. The MB4 can mine, separate and refine minerals, alloys and even on occasions precious metals and gem stones.

The disadvantage is the risk of mining others' claims, resulting in an aggressive response to your activities. In some areas it is illegal to mine and police, depending their mood, may not be too interested in maintaining a public image of fairness and understanding and may blast you to pieces.

SETTING UP YOUR MB4

1. Choose a mining site with a temperature below 200 degrees Centigrade. The most likely suitable locations will be on systems' inner planets which are more likely to be mineral rich. Ones which humans have hardly touched are more likely to be mineral rich as machines like the MB4 and its predecessors are very thorough, and will have scoured most of the surface of core worlds by now. To test the composition of the crust, you need to land. ►

- ▶ 2. Land at the chosen site and select the Weapons Control Panel by clicking on the Scanner.
3. Activate the Unload Rig icon (**Fig 78**) which will cause the mining rig to be unloaded whereupon it will analyse a sample of the crust and relay the results to your on-board computer. If the prospects are good it will bed itself in and begin drilling immediately. You may then take off and come back later once it has mined the full capacity of 10 tonnes.



Fig 78: the Unload Rig Icon

FINDING THE MB4 AGAIN

All the mines have a beacon which has your own coded signal allowing the computer to pin-point its position. If you pick up someone else's rig, your computer will automatically register the code of the owner. All other rigs belonging to them in this star system will then be shown on your inventory page. This means that stealing ore is possible, however the same can be done to you. A safeguard is to avoid placing numerous rigs in one system, so that they are not so easily found should one of your rigs be purloined. Your beacons will use a different code in each system.

1. Select the Inventory icon **F3** and cycle through until you come to the **Mining Installations** page (**Fig 79**). It will list your rigs and their location.

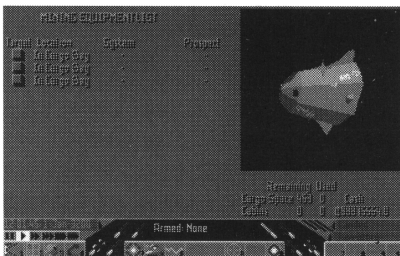


Fig 79: the Mining Installations page shows your rigs

2. Fly to the star system in which a particular rig is situated.
3. Set up the **Mining Installations** page again and use the button next to the rig you wish to find.
4. The on-board computer will then set it up as your current target. You may then fly to it manually or with the Autopilot. You can deselect the target as before by placing the pointer away from the target and using the left-hand mouse button.

COLLECTING THE ORE

1. Land near to the installation and select the Load Rig icon (**Fig 80**) with one click. This will remotely instruct the machinery to off load ore into your hold until it is full. It will be no more than 10 tonnes at a time because that is the maximum capacity of the MB4's hopper.



Fig 80: the Load Rig icon

2. If there is no ore to collect the first selection of the icon will load the rig onto the ship, if you have space.
3. Your cargo inventory (Inventory icon **F3**) will show the minerals on board.

COLLECTING THE MB4 MINING MACHINE

1. Land next to the installation and click on the Load Rig icon twice so that the rig and the contents of its hopper are taken on board.
2. As stated above, the rig will be loaded after the first click if there is no ore in the hopper.
3. The rig may be left for further mining. There is no need to bring it on board if you intend to deposit it in the same place.
4. If you want to move the MB4 to another location on the same surface because a site is 'mined out', it is worth moving it a good distance. This is because the MB4 probes quite a large area with its underground drills.
5. If your MB4 had found a rich seam of minerals, do not move it as the seam may be a long way below ground and the MB4 may not be able to find it again.●

APPENDIX ONE

**SHIPYARD
EQUIPMENT**

SEE THE COMBAT SECTION ON PAGE 35
FOR DETAILS OF USE OF WEAPONS

MINES AND BOMBS



XB13 PROXIMITY MINE Explodes when object is within range. They are carried on missile pylons in place of a missile.



XB74 DUMMY PROXIMITY MINE Exactly the same in appearance as the Proximity Mine, even on radar, but they do not explode, in fact they do nothing except increase your foe's laundry bill. You can even recover them like cargo if you have a Fuel Scoop and a Cargo Conversion, but beware of accidentally scooping a real one!



ENERGY BOMB Causes the drive system of smaller ships to overload and explode, but not your own as it is very specific. It can be withstood if a ship has a strong enough shield.

MISSILES

The COMBAT section on page 38 gives additional information. Note that all the missiles have the same flying characteristics.



KL760 HOMING MISSILE For destroying small spaceships and damaging larger ones.



LV111 SMART MISSILE Similar to the Homing Missile but has ECM protection (not effective against Navy Grade ECM). Has a greater explosive power than the Homing Missile.



NN500 NAVY GRADE MISSILE Even more bang for your money and immune to any known ECM system although it is rumoured that technology is improving in this field.

GUNS

The COMBAT section on page 38 provides further details.

30MW MINING LASER Pulse laser, set up to blast asteroids into recoverable portions if you see your future in mining. Can be used as a weapon but its repeat rate is not as fast as weapon lasers.

1MW PULSE LASER The very same bottom of the range laser weapon as the Phlaschgyt that came with your ship. Seasoned combatants consider it only of use for tattooing numbers onto slaves. Better than nothing.

5MW PULSE LASER Otherwise known as the Phlaschbugher. More powerful than the Phlaschgyt, but less devastating than a Beam Laser.

BEAM LASER Continuous laser beam which is more devastating than a Pulse Laser. The 1MW, 4MW, 20MW and 100MW Beam Lasers are the same but are more destructive with increasing wattage.

LASER COOLING BOOSTER Some busy pilots find their normal laser cooling equipment inadequate. Since lasers cut out when they overheat, this device is a bonus.

SMALL PLASMA ACCELERATOR Very big and heavy and carried by larger ships and Naval ships only. It is extremely potent and obliterates small to medium ships with one shot.

LARGE PLASMA ACCELERATOR The ultimate weapon pilots aspire to owning.

ECM SYSTEMS



ECM SYSTEM Short for Electronic Counter Measures. A clever device this, as it causes detonation of all activated Homing Missiles in range (including your own).



NAVAL ECM SYSTEM This higher specification system can also destroy the Smart Missile. Only obtainable at larger Shipyards.

ENVIRONMENTAL CONTROL SYSTEMS

CARGO BAY LIFE SUPPORT Superb environment control, including deodoriser and choice of four fresh air scents, Fomalhaut Harvest, Ma's Cookies, Seashore and Solar Breeze. Needed for transportation of live animals and slaves.

EXTRA PASSENGER CABIN For one person. It comes with life support, food dispenser and Holovid dream inducer for long journeys. An extra facility is the automatic decor control which changes in order to compliment the mood of the occupants. It is activated by sensors of heat and pheromones. Takes up five tonnes of cargo space.

ELECTRONIC EQUIPMENT FOR CONTROL AND SURVEILLANCE

AUTOMATIC PILOT The Robocruise automatic navigation system has the capability to plot and control travel to any destination within a system. For details of how to use the Automatic Pilot see the NAVIGATION AND FLIGHT section on page 20.

AUTOREFUELLER DEVICE This automatically transfers 1t of fuel from the cargo bay to the internal tank of a ship's engine when it is needed, so preventing any wastage. It also avoids any embarrassing moments when your engines fail during combat or docking.

SCANNERS The scanner section in the middle of the console is provided as standard on most ships. Some hardened space travellers remove it in the belief that demonstrates a certain amount of machismo, but others say this demonstrates something else.



RADAR MAPPER Scans for information on a targeted ship. For details of how to use the Radar Mapper see the COMBAT section on page 43.



HYPERSPACE CLOUD ANALYSER Determines the destination and the exact time and date of arrival of ships by analysing the residual space-time disturbance left behind after a hyperspace jump. You will also be told the mass of the ship which has left or is about to arrive. See HYPERSPACE in the NAVIGATION AND FLIGHT section, and also Combat on page 43.

DEFENCE

SHIELD GENERATOR This device affords additional shielding to the normal damage resistance of a hull. More than one can be fitted at once and the effect is cumulative. They recharge from the ship's power system, and each shield takes a fixed amount of time to do so. For example a large ship with ten shield generators will take the same time to recharge as a ship with one shield. The ship with ten however, will achieve the same defence as the ship with one shield in a tenth of the time because of the additive effect of Shield Generators. See the COMBAT section on page 35.

ENERGY BOOSTER UNIT Boosts the recharging rate of all Shield Generators fitted. A good buy for very large ships.



ESCAPE CAPSULE For those sticky moments when a fast exit is prudent. It has no weapons or shields.

ATMOSPHERIC SHIELDING Additional coating to the hull which enables a ship to enter an atmosphere at high speed.

HULL AUTO REPAIR SYSTEM A large piece of equipment which is generally only fitted to larger ships. Exactly how this works is a trade secret, but it does entail placing many microbots in the hull-reinforcing channels. See the COMBAT section.

ENGINES AND MISCELLANEOUS

INTERPLANETARY DRIVE An ordinary, lightweight engine that uses hydrogen fuel contained within the drive. It is not capable of hyperspace jumps but is suitable for small interplanetary hops. It is equivalent to the Class 1 Hyperdrive but has no hyperspace capability.

STANDARD HYPERDRIVES Standard Hyperdrives are readily available and are used by most ships. They use hydrogen fuel which can be bought or scooped (see Fuel Scoop) and all waste products are used as reaction mass by the thrusters. The range of a Standard Hyperdrive engine depends on the size of ship it is fitted to. For example, a Class 3 engine will have a greater range if fitted to a 200 tonne ship rather than a 300 tonne ship. Although the classes are listed up to seven, higher classes exist but are only obtainable from specialists.

MILITARY HYPERDRIVES This is a different breed of engine to the Standard Hyperdrive in that it has a greater range and is faster and lighter. This means that a small ship can carry an engine of the military type that is equivalent to a Standard Hyperdrive that would be too big to fit. All military ships are driven by them. They run on Military Fuel which is much more expensive and has drawbacks (see MILITARY FUEL in APPENDIX TWO: TRADE ITEMS Section on page 79).

A Military Hyperdrive will give your ship advantages over the competition, but it will cost you to run it. In the same way as Standard Hyperdrives, the range is a function of the size of the ship and the maximum possible range for the engine. Military Hyperdrives are not widely available and there are only three classes for sale. The reason is thought to be instability occurring in bigger engines, but rumours say that military engineers are working on this problem. They are also reputed to be making even lighter engines.

FUEL SCOOPS AND MINING EQUIPMENT

FUEL SCOOP Scoops fuel from the upper layers of gas giants or the photosphere of cool stars when you fly at below about 30Km altitude while travelling forwards at speed. In order to scoop from a gas giant, Atmospheric Shielding is needed. A star however, requires greater protection for your ship in the form of an Atmospheric Shield and a Shield Generator. Even with these it is still dangerous and only a desperate pilot would attempt it.

CARGO SCOOP CONVERSION Allows the Fuel Scoop to be used to salvage jettisoned cargo and Dummy Mines. It is also used to collect ore during asteroid mining, and explosion debris from ships.

MB4 MINING MACHINE This amazing machine prospects, mines and refines minerals for you (see the MINING section on page 68) but is not readily available.

APPENDIX TWO

TRADE ITEMS

THE FOLLOWING IS A LIST OF TRADE ITEMS
WHICH ARE ALWAYS SOLD IN UNITS OF ONE TONNE

AIR PROCESSORS Devices used in life support systems to remove unwanted gasses from the air. These are vital to many mining establishments, keeping the air in the huge underground complexes breathable.

ANIMAL MEAT Real meat from an animal. A delicacy, but the market for this is growing as a revolt against synthetic meat. People have become unsettled by the thought of their food growing in vats of seething, viscous fluid, the stench of which is indescribable. The idea that real animal meat once felt the sun on its back and frolicked in a meadow feels more wholesome and natural and such meat is claimed by many to taste better. Given that the amount of meadow available is far exceeded by the hooves to roam it and that factory farming is unfashionable, the meat is rare and widely sought after. Trading in animal meat is illegal in some places.

ANIMAL SKINS This covers the skins of all sorts of animals and parts of them. It seems that the more that go into a garment, the more prized it is. A ridiculous extreme is a coat woven from eyelashes of the Sweetums Scroblet, an ugly animal with a bad temperament and no endearing qualities other than colourful, luminescent eyelashes.

BATTLE WEAPONS The heavy weapons used on the battlefield and usually illegal.

COMPUTERS Mostly used for administration and as components for automated machines like space craft, though some advanced cultures use them a great deal for interactive entertainment systems.

FARM MACHINERY Machinery used to, erm... farm.

FERTILIZER Fertilizers are usually manufactured in vast chemical plants, but organic waste is often used to supplement this.

FRUIT AND VEGETABLES This can seem like a loose term looking at some of the produce that comes under this classification. One could be forgiven for taking up a shovel and disinfectant when faced for the first time with the Oosli from the Fomalhaut system.

GEM STONES They come in all colours and different levels of sparkle. Fashions come and go, but the current gem to be seen wearing is the Zublic, a colourless stone that is totally reflective. It is very easily mimicked but only the real stone is non-irritant to body, so those who are status conscious have them sewn into their skin.

GRAIN One of few foodstuffs that is both traditionally grown and not too expensive.

HAND WEAPONS Firearms. Many cultures regard them as a necessary accessory and feel 'naked' without one. Illegal in many systems.

HEAVY PLASTICS Have a variety of uses especially in high temperature environments, like rocket engines. Manufactured in large industrial complexes.

HYDROGEN FUEL The normal four star fuel for spacecraft. All the waste products are used as reaction mass in the thrusters. It can also be obtained by scooping it from stars and gas giants (see FUEL SCOOPS in APPENDIX ONE: SHIPYARD EQUIPMENT on page 75).

INDUSTRIAL PARTS Everything from fusion motors to nuts and bolts.

LIQUID OXYGEN Used mainly by settlements on airless worlds for life support systems.

LIQUOR Covers all intoxicating drinks from interesting local hooches such as the Bourbon from the system of Epsilon Indi to unexciting brews made by large industrial companies. An example is Splag, which is akin to watery Old Nova, but some have been less generous in their appraisal.

LIVE ANIMALS Used for meat, exhibition or recreation or just companionship. Your hold must have a life support facility to carry them.

LUXURY GOODS Many items are classed as luxury goods, for example perfumes, jewellery, artefacts and fabrics. The most treasured are generally produced on esteemed worlds like Earth.

MEDICINES Drugs are, as always, big business as people would rather be reassured by a drop of something that tastes foul, rather than examine their way of life that more often than not causes the ill health. However, the most healthy person can still fall foul of bugs such as black hole fever (well known but seldom talked about, except in jest with references to escape velocity usually being made).

METAL ALLOYS They have hundreds of uses, one example is the production of foam metal, valued for its lightness and use as electromagnetic shielding.

MILITARY FUEL Very high energy per unit weight. It is manufactured and consists of an engineered molecule with anti-matter atoms suspended in it. It is not always available and is expensive. You need to weigh up the advantages of greater range and

speed with the fact that it is converted to radioactives when consumed.

MINERALS There is little to say about minerals. Mined on rocky planets by machinery except on planet Major (van Maanen's star) where the Guardians of the Free Spirit exhume it with only a hammer and chisel. They believe in severe hardship and live underground. It is thought that money (left over after buying necessities like oxygen) is burned in ceremonies intended to purify the soul. The worshippers think of all the luxuries, such as a salve for their bleeding hands, that the money could have bought, causing great anguish which is thought to be cleansing.

NARCOTICS The most common is Lyrae weed. Narcotics are readily available on some large corporate manufacturing complexes to induce a sense of well-being in such appalling conditions. Occasionally a few workers are killed due to insensibility or hallucinations, but it is considered that they are better off that way and there are plenty more where they came from. Illegal in many places.

NERVE GAS Expect the police in most places to take up a chase if you trade in this.

PRECIOUS METALS Mainly used for adornment and trying to maintain stability in unstable financial systems. Generally cheaper in the outer systems, where precious metals have not yet been mined out.

RADIOACTIVES Radioactive materials for example Plutonium and Tritium. Note that this item has a negative trade value, in other words, you have to pay for someone to take it off your hands. Some make a living out of being paid to take this waste away and deliver it to reprocessing plants (ie, anywhere that has Radioactives as a major import). More unscrupulous and irresponsible characters will prefer to jettison it instead, risking prosecution. This is a highly illegal practice and locals are usually vehemently opposed to this act. Police often don't bother with questions but deal with you there and then, as this not only saves on police time but court fees as well.

ROBOTS This covers a whole range of automata. Generally they are intricate machines used to do everything from serving canapes to use as assault troops. They are illegal in a few cultures, mainly because of the violation of their work ethic, but also the extreme techno-fear some people experience.

RUBBISH Again, this has a negative price, so you must pay to dispose of it. Some cargo items when decompressed (by being jettisoned) will turn into rubbish.

SLAVES Consider carefully where you are going to trade because slave trading is illegal

in many systems, where it is seen as unacceptable. Life support needed.

SYNTHETIC MEAT This is the most common form of protein to be found, so it is relatively cheap. Grown in vats, this meat is in no way derived from animals, though most would agree that it tastes exactly the same as real meat. It is sold in one flavour, called Original, which is fairly bland and unexciting. Individual flavours are added by the user, for example Earth beef, Lava hog from Biggs Colony or Brog buck from Homeland around Beta Hydri (for those who like their meat to bite back).

WATER H_2O , usually needed by small industrial settlements and those with no natural water supply. ●

APPENDIX THREE

AN

INTRODUCTORY

JOURNEY

IF YOU WANT TO BE GUIDED THROUGH A MISSION
BEFORE GOING OUT ON YOUR OWN, READ ON!

TO BEGIN...

You are at Sirocco Starport, on Merlin, a planet orbiting a gas giant which in turn orbits Ross 154, 9.35 light years away from Earth. What you can see on the screen is the front view from your ship with the ringed gas giant, Aster, looming in the sky. The time of day and the date are given on the left-hand side of the console.

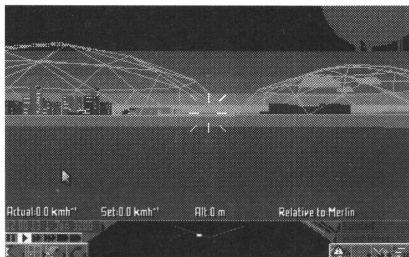


Fig 81: your view from Sirocco Starport on Merlin

1. First take a look at the system you are in.

- (a) Select the Galactic Map icon **F2** and you will see a map of all the stars in your vicinity. Ross 154 is in the middle, highlighted in green.

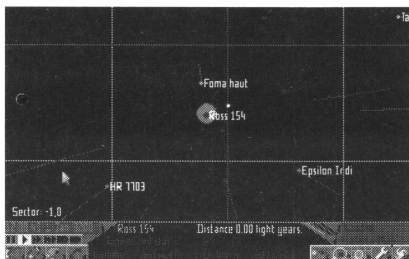


Fig 82: Ross 154 is highlighted on the Galactic Map

2. Find out details about the system.

- (a) Select the Data icon **F6** and a diagram of your system will be shown.
- (b) Count two bodies from the star, Ross 154. This is Aster. Now click on the planet below it and information on Merlin will come up.
- (c) Select the Economy icon **F7** to get trade details for the whole system. Notice that major exports are animal meat (this is fish on Merlin) and liquid oxygen so both should be relatively cheap. ►

- (d) Select the Political icon **F8** to get information on the social structure. This system is under Federation control so should be reasonably safe.

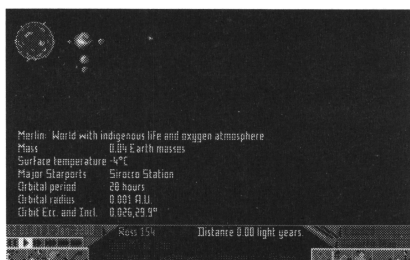


Fig 83: viewing information on Merlin

3. Find a place to sell the goods you buy at a reasonable price.

- (a) Go back to the grid by using the Galactic Map icon **F6**.
- (b) Use the **Arrow (Cursor)** keys to move the map until Barnard's Star (look up and then right) is in the middle of the screen and highlighted in green.
- (c) Select the Data icon **F6**.
- (d) Click on the bodies until you find the space station orbiting Birminghamworld, it is called Boston Base.
- (e) In the same way as steps 2(c) and 2(d), check the economy and social structure. You will see that animal meat and liquid oxygen are imports. The system is a corporate state and it should be reasonably safe, so you could trade here.
- (f) You can see the orbits of the system's bodies by using the Orbital Map icon **F10**.

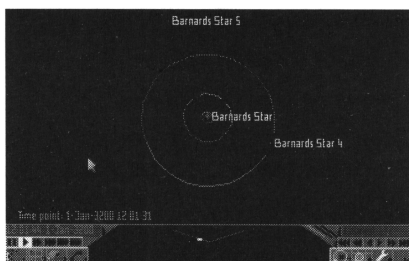


Fig 84: view the orbits of the Barnard's Star bodies

- (g) If you want to take a closer look, you can use the Zoom In icon **F7** and the Zoom Out icon **F8**. Click on the body to place it into the centre of the screen and then use the icons.

4. Buy one tonne of fish at Merlin. You can only trade while in dock so now is the time to do it.
 - (a) Select the Communication icon **F4**, and you will be presented with a list of options.
 - (b) Choose **Stockmarket**.
 - (c) A list of items with **Buy** and **Sell** buttons is now displayed so locate **Animal Meat**. You can afford to buy one tonne of animal meat.



Fig 85: buying Animal Meat on the Stockmarket

- (d) Click on the **Buy** button for animal meat once so that one tonne of animal meat will be autoloaded into your hull. (If you ever buy too much by mistake, simply click on the **Sell** button until you have the right amount). The console will display the amount of cash and cargo space you have left.
5. See if there are any packages to take to Barnard's star. This sort of thing is what makes money but there is some risk involved. The good thing about packages is that they take up negligible cargo space and do not require cabins or life support.
 - (a) Click on the Communications icon **F4** again followed by Bulletin Board.
 - (b) Scroll through the advertisements using the up and down **More...** arrows.
 - (c) There may not be a suitable advertisement but if there is one, click on it. If there isn't go to step 6.
 - (d) A list of replies will be presented to you from which you must choose one to send by clicking on it. The brave will click on "**OK - agreed.**" with no questions asked.
 - (e) The package will be autoloaded into your ship. ►

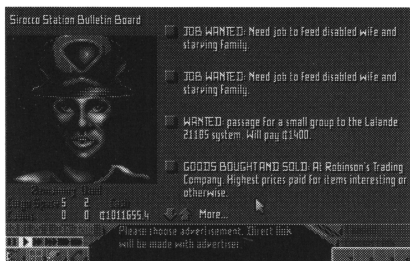


Fig 86: choose an ad from the Bulletin Board

- (f) You can check that it is on board by clicking on the Inventory icon **F3** until the page showing passengers and small packages is displayed.

6. Take off for Barnard's Star system.

- Go back to the front view by using the View icon **F1** and click on it until **Front View** is displayed on the right of the console.
- Select the Communication icon **F4** and you will be given a list of options. Click on **Launch Request**.
- When clearance is indicated on the console, select the Flight Control icon **F7**. This will cause your vertical thrusters to engage, lifting you slowly upwards.



Fig 87: an external view of take off

- Tip up the nose of the ship by moving the mouse backwards whilst holding the right-hand mouse button down.
- Activate the thrusters using the **Enter** key for a couple of seconds and you will begin to fly out of the atmosphere. You now have manual control.

7. Make a hyperspace jump to Barnard's Star.

- (a) Use the Galactic Map icon **F2** and make sure Barnard's Star is in the middle of the screen where it will be highlighted in green.
- (b) Return to View mode by using the View icon **F1**.
- (c) Activate the hyperspace engine with the Hyperspace icon **F8**. After your journey through hyperspace you can see the effects of the disturbance. Use the View icon **F1** to get a the rear view in order to see it. This hyperspace cloud behind you is visible for an enormous distance and may attract pirates, so it is wise to leave it as soon as possible by pressing the **Enter** key to increase your Set speed. Click on the View icon again until you get back to the front view.

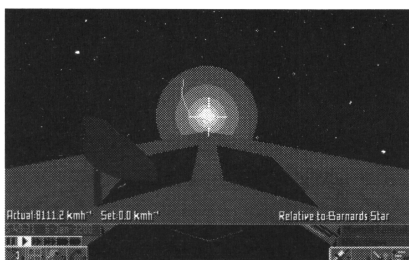


Fig 88: the remnants of a hyperspace jump

- (d) Select the Identification Text icon **F10** which will overlay names onto the systems bodies which may not yet be visible to the naked eye.
- (e) If you wish to look around then you can do so by holding down the right mouse button to swing the ship round. This is not essential to get to your destination.

8. Fly to Birminghamworld by using the Autopilot and Stardreamer Time Control.

- (a) Take a look at the system structure by using the Galactic Map icon **F2** and then the Current System Map icon **F2** to obtain an orbital map of the current system.
- (b) Zoom in using the Zoom icon **F7** until you can see Birminghamworld clearly.
- (c) Put Birminghamworld in the middle of the screen by clicking on it then zoom in until it is clearly defined and the orbital lines almost cover the width of the screen.
- (d) When you can see the space station name (Boston Base) move the mouse while holding down the right-hand mouse button so that you can see the space station clearly. ►

- (e) Set up the destination for the Autopilot by using the Targeting icon **F10**.

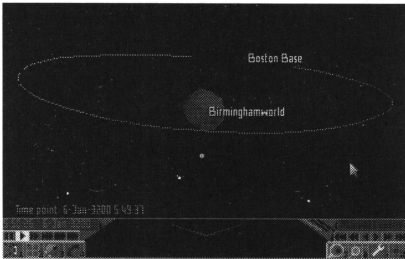


Fig 89: zoom in on Birminghamworld

- (f) You will be instructed by the console to select a target so point at the space station and click on it and a homing square will be displayed. If you take too long doing this you may have to use the Targeting icon again.
- (g) Return to View mode with the View icon **F1**.
- (h) Engage the Autopilot with the Flight Control icon **F7** by activating it until **Autopilot** is shown on the console. The ship is no longer under manual control.
- (i) You will see targeting squares looking like a tunnel leading to Boston Base. As you get closer they will come towards you more rapidly, indicating that you should slow down as you approach. Ideally, these should pass at a constant rate.

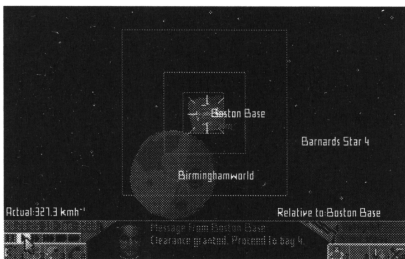


Fig 90: targeting tunnels leading to Boston Base

- (j) Even though you are relatively close to Boston Base it will still take a long time to get there so use the Stardreamer Time Control to make time appear to pass more quickly. Further details of its function are given in the NAVIGATION section on page 22.
- (k) Locate the Time Control icons. The single arrow sets normal time and each icon to the right increases the apparent rate of passage of time by ten times. Select 1000 times normal time (four arrows) or 10,000 times normal time (the last icon on the right) as you wish. When you approach the space station the on-board computer will return you to normal time for docking. ►

- (l) The docking process is handled by the Autopilot including obtaining clearance from Traffic Control. If you do not wish to watch the docking then you may operate the time control again.

9. Sell your goods.

- Once docked select the Communication icon **F4** and choose **Stockmarket** again.
- Sell your goods by using the **Sell** buttons, ie, click on the **Sell** button for Animal Meat once.



Fig 91: selling your goods on the Stockmarket

- The money shown under **Cash** at the bottom left of the console should now be a greater sum than you started with, unless you have been very unlucky with the stockmarket prices.
- Remember to refuel by buying at least one tonne of hydrogen fuel!●

APPENDIX FOUR

THE

MECHANICS

OF

SPACE FLIGHT

By David Braben

WARNING: NOT FOR THE TECHNICALLY FAINT HEARTED!

YOU DO NOT NEED TO READ THIS TO FLY YOUR SHIP

FLY BY WIRE

As starship designers through the ages have found, space craft have so many potential degrees of freedom they are impractical for a mere human to control to the full unaided. Logically a free flying combat craft has at least five independent directions (or vectors) to control. Those vectors are:

1. Facing vector (unit magnitude) **F**
2. Velocity vector **V**
3. Thrust vector **T**
4. Camera viewing vector **C**
5. Weapon vector **W**

It is clearly logical to combine some of these, but the more they are combined, the more functionality is lost. Faulcon de Lacy (and indeed most ship manufacturers) combine (1), (4) and (5) and control (2) and (3) automatically, leaving the pilot to control only (1), with the option of disabling the automatic control of (2) and (3) when necessary. Even this seems a handful for a species evolved to move in only two and a half dimensions (up and down are very much secondary to north, south, east and west).

The pilot is assumed to have a desired velocity vector **D** along his or her facing vector, the magnitude of which is the desired speed **s** they have set.

Hence: **$D = sF$**

and thrust to achieve velocity **$T = mf(D - V)$**

where **f** is a factor chosen for fuel efficiency

and **m** is the mass of your craft

A maximum value is given to **f** (about 1), to avoid wasteful thrusting and possible oscillations. This is why your craft will slowly settle down over the landing pad even with a zero set speed. At higher speeds the limits of the power of the thrusters effectively restrict the value of **f**. The desired thrust is resolved into components along each of the ships working thrusters and if any of the these cannot provide sufficient thrust then the value of **f** is reduced appropriately (preserving the direction of thrust is more important than its magnitude).

FRAMES OF REFERENCE

The problems of the fly-by-wire technique are further complicated when considering the frames of reference in which velocities are measured. When a vehicle moves slowly along a street, say, the driver does not want to know that both the street and the vehicle are moving sideways at many thousands of kilometres per hour (due to the velocity of the planet around the star, and the rotation of the planet). Indeed, if the vehicle were to face the way it is travelling, then its motion along the road would be almost irrelevant. What the driver wants is to face along the direction of travel in the frame of reference of the planet, which is both moving and rotating.

Hence: $\mathbf{D} = \mathbf{sF} + \mathbf{R}$

where \mathbf{R} is the velocity of the frame of reference

and ideal thrust $\mathbf{T} = m\mathbf{f}(\mathbf{D} - \mathbf{V})$

$\mathbf{T} = m\mathbf{f}(\mathbf{sF} + \mathbf{R} - \mathbf{V})$

Your on-board computer automatically selects the body you are most likely to want to define a frame of reference for your motion. This is usually a planet or moon, but can also be a space station or large ship. It also decides whether it would be more intuitive to use a rotating frame or not. For space stations, it is only sensible to use a rotating frame in the docking tunnel - otherwise your ship continually thrusts to attempt to move in a circle in time with a similar point on the station.

CHOICE OF FRAMES OF REFERENCE

The body used to define your current frame of reference is shown on the bottom right of your head-up display. This is chosen by a weighting function. For planets and stars, this is based on mass, thus a star's sphere of influence generally extends way beyond its planets. For other bodies it is based on their dimensions.

You may notice your ship's engines suddenly starting to thrust when a different frame of reference is chosen. This is not a fault with your ship but is because your set speed has suddenly appeared to change as it is now measured relative to the new body.●

APPENDIX FIVE

SHIP

IDENTIFICATION

FACTS AND FIGURES ABOUT THE MOST
COMMON CRAFT ENCOUNTERED



ADDER

HULL MASS 15 TONNES

MASS (FULLY LADEN) 55 TONNES

INTERNAL CAPACITY (NO DRIVE) 40 TONNES

RETRO THRUSTER ACCELERATION 8 EARTH G

MAIN THRUSTER ACCELERATION 18 EARTH G

CREW 1

GUN MOUNTINGS 1+F

MISSILE PYLONS 0

ALLEGIANCE INDEPENDENT, FEDERATION

ANACONDA

HULL MASS 150 TONNES

MASS (FULLY LADEN) 800 TONNES

INTERNAL CAPACITY (NO DRIVE) 650 TONNES

RETRO THRUSTER ACCELERATION 3 EARTH G

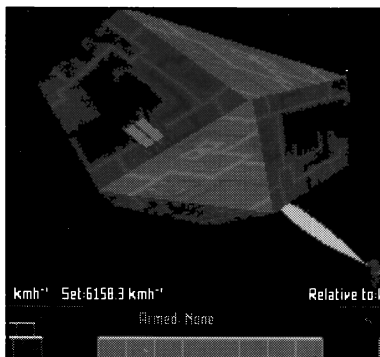
MAIN THRUSTER ACCELERATION 6 EARTH G

CREW 10

GUN MOUNTINGS 2+F

MISSILE PYLONS 8

ALLEGIANCE INDEPENDENT



ASP EXPLORER

HULL MASS 30 TONNES

MASS (FULLY LADEN) 150 TONNES

INTERNAL CAPACITY (NO DRIVE) 120 TONNES

RETRO THRUSTER ACCELERATION 7

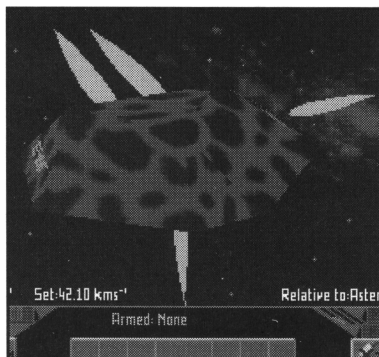
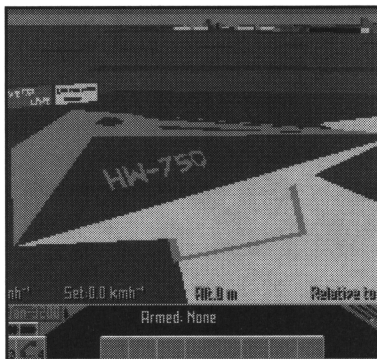
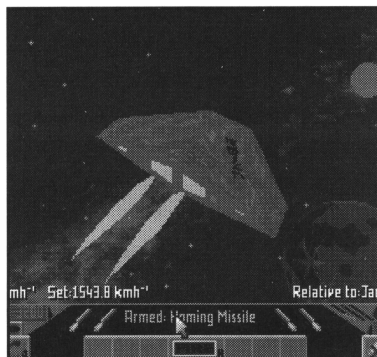
MAIN THRUSTER ACCELERATION 22

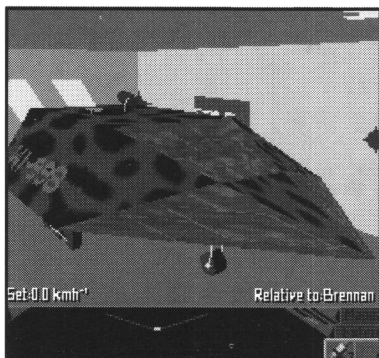
CREW 2

GUN MOUNTINGS 2+F

MISSILE PYLONS 1

ALLEGIANCE INDEPENDENT, FEDERATION

BOA**HULL MASS** 200 TONNES**MASS (FULLY LADEN)** 1500 TONNES**INTERNAL CAPACITY (NO DRIVE)** 1300 TONNES**RETRO THRUSTER ACCELERATION** 4 EARTH G**MAIN THRUSTER ACCELERATION** 8 EARTH G**CREW** 12**GUN MOUNTINGS** 4+F**MISSILE PYLONS** 6**ALLEGIANCE** INDEPENDENT**COBRA MK I****HULL MASS** 15 TONNES**MASS (FULLY LADEN)** 75 TONNES**INTERNAL CAPACITY (NO DRIVE)** 60 TONNES**RETRO THRUSTER ACCELERATION** 6 EARTH G**MAIN THRUSTER ACCELERATION** 16 EARTH G**CREW** 1**GUN MOUNTINGS** 2+F**MISSILE PYLONS** 2**ALLEGIANCE** INDEPENDENT, FEDERATION**COBRA MK III****HULL MASS** 20 TONNES**MASS (FULLY LADEN)** 100 TONNES**INTERNAL CAPACITY (NO DRIVE)** 80 TONNES**RETRO THRUSTER ACCELERATION** 7 EARTH G**MAIN THRUSTER ACCELERATION** 20 EARTH G**CREW** 1**GUN MOUNTINGS** 2+F**MISSILE PYLONS** 4**ALLEGIANCE** INDEPENDENT, FEDERATION



CONSTRUCTOR

HULL MASS 30 TONNES

MASS (FULLY LADEN) 120 TONNES

INTERNAL CAPACITY (NO DRIVE) 90 TONNES

RETRO THRUSTER ACCELERATION 10 EARTH G

MAIN THRUSTER ACCELERATION 22 EARTH G

CREW 2

GUN MOUNTINGS 2+F

MISSILE PYLONS 2

ALLEGIANCE INDEPENDENT, FEDERATION

EAGLE LONG RANGE FIGHTER MK I

HULL MASS 5 TONNES

MASS (FULLY LADEN) 25 TONNES

INTERNAL CAPACITY (NO DRIVE) 20 TONNES

RETRO THRUSTER ACCELERATION 10 EARTH G

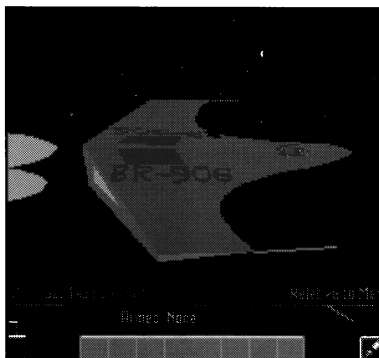
MAIN THRUSTER ACCELERATION 25 EARTH G

CREW 1

GUN MOUNTINGS 1

MISSILE PYLONS 2

ALLEGIANCE FEDERATION, EMPIRE



EAGLE LONG RANGE FIGHTER MK II

HULL MASS 6 TONNES

MASS (FULLY LADEN) 28 TONNES

INTERNAL CAPACITY (NO DRIVE) 22 TONNES

RETRO THRUSTER ACCELERATION 4 EARTH G

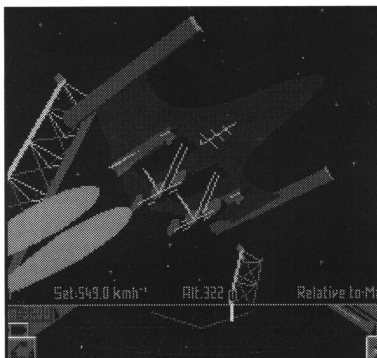
MAIN THRUSTER ACCELERATION 28 EARTH G

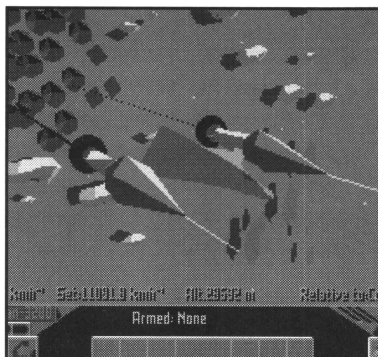
CREW 1

GUN MOUNTINGS 1

MISSILE PYLONS 2

ALLEGIANCE FEDERATION

EAGLE LONG RANGE FIGHTER MK III**HULL MASS** 8 TONNES**MASS (FULLY LADEN)** 30 TONNES**INTERNAL CAPACITY (NO DRIVE)** 22 TONNES**RETRO THRUSTER ACCELERATION** 15 EARTH G**MAIN THRUSTER ACCELERATION** 28 EARTH G**CREW** 1**GUN MOUNTINGS** 1**MISSILE PYLONS** 2**ALLEGIANCE** EMPIRE**FALCON****HULL MASS** 5 TONNES**MASS (FULLY LADEN)** 16 TONNES**INTERNAL CAPACITY (NO DRIVE)** 11 TONNES**RETRO THRUSTER ACCELERATION** 9 EARTH G**MAIN THRUSTER ACCELERATION** 30 EARTH G**CREW** 1**GUN MOUNTINGS** 1**MISSILE PYLONS** 2**ALLEGIANCE** FEDERATION**GECKO****HULL MASS** 11 TONNES**MASS (FULLY LADEN)** 45 TONNES**INTERNAL CAPACITY (NO DRIVE)** 34 TONNES**RETRO THRUSTER ACCELERATION** 9 EARTH G**MAIN THRUSTER ACCELERATION** 6 EARTH G**CREW** 1**GUN MOUNTINGS** 2**MISSILE PYLONS** 1**ALLEGIANCE** INDEPENDENT



IMP COURIER

HULL MASS 130 TONNES

MASS (FULLY LADEN) 480 TONNES

INTERNAL CAPACITY (NO DRIVE) 350 TONNES

RETRO THRUSTER ACCELERATION 6 EARTH G

MAIN THRUSTER ACCELERATION 16 EARTH G

CREW 3

GUN MOUNTINGS 1

MISSILE PYLONS 6

ALLEGIANCE EMPIRE

IMP TRADER

HULL MASS 175 TONNES

MASS (FULLY LADEN) 700 TONNES

INTERNAL CAPACITY (NO DRIVE) 525 TONNES

RETRO THRUSTER ACCELERATION 4 EARTH G

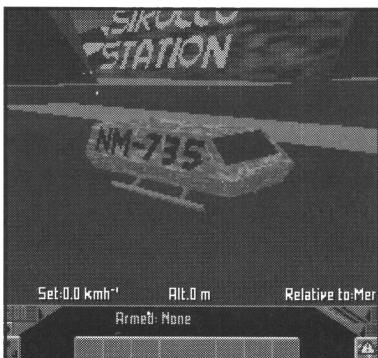
MAIN THRUSTER ACCELERATION 9 EARTH G

CREW 6

GUN MOUNTINGS 1

MISSILE PYLONS 6

ALLEGIANCE EMPIRE



INTERPLANETARY SHUTTLE

HULL MASS 4 TONNES

MASS (FULLY LADEN) 8 TONNES

INTERNAL CAPACITY (NO DRIVE) 4 TONNES

RETRO THRUSTER ACCELERATION 3 EARTH G

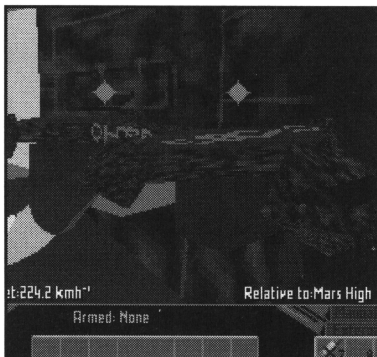
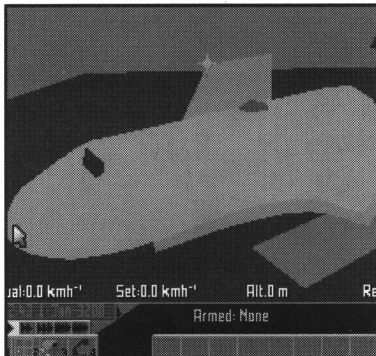
MAIN THRUSTER ACCELERATION 5 EARTH G

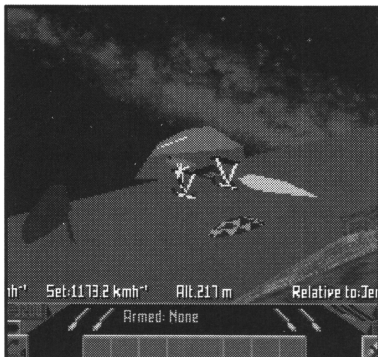
CREW 1

GUN MOUNTINGS 0

MISSILE PYLONS 0

ALLEGIANCE INDEPENDENT, FEDERATION, EMPIRE

KRAIT**HULL MASS** 8 TONNES**MASS (FULLY LADEN)** 38 TONNES**INTERNAL CAPACITY (NO DRIVE)** 30 TONNES**RETRO THRUSTER ACCELERATION** 10 EARTH G**MAIN THRUSTER ACCELERATION** 20 EARTH G**CREW** 1**GUN MOUNTINGS** 1**MISSILE PYLONS** 4**ALLEGIANCE** INDEPENDENT**LIFTER****HULL MASS** 3 TONNES**MASS (FULLY LADEN)** 10 TONNES**INTERNAL CAPACITY (NO DRIVE)** 7 TONNES**RETRO THRUSTER ACCELERATION** 2 EARTH G**MAIN THRUSTER ACCELERATION** 4 EARTH G**CREW** 1**GUN MOUNTINGS** 0**MISSILE PYLONS** 0**ALLEGIANCE** FEDERATION**LION****HULL MASS** 65 TONNES**MASS (FULLY LADEN)** 300 TONNES**INTERNAL CAPACITY (NO DRIVE)** 235 TONNES**RETRO THRUSTER ACCELERATION** 3 EARTH G**MAIN THRUSTER ACCELERATION** 5 EARTH G**CREW** 4**GUN MOUNTINGS** 4+F**MISSILE PYLONS** 6**ALLEGIANCE** FEDERATION



MORAY

HULL MASS 17 TONNES

MASS (FULLY LADEN) 87 TONNES

INTERNAL CAPACITY (NO DRIVE) 70 TONNES

RETRO THRUSTER ACCELERATION 6 EARTH G

MAIN THRUSTER ACCELERATION 14 EARTH G

CREW 1

GUN MOUNTINGS 1+F

MISSILE PYLONS 4

ALLEGIANCE INDEPENDENT, FEDERATION

OSPREY

HULL MASS 4 TONNES

MASS (FULLY LADEN) 15 TONNES

INTERNAL CAPACITY (NO DRIVE) 11 TONNES

RETRO THRUSTER ACCELERATION 8 EARTH G

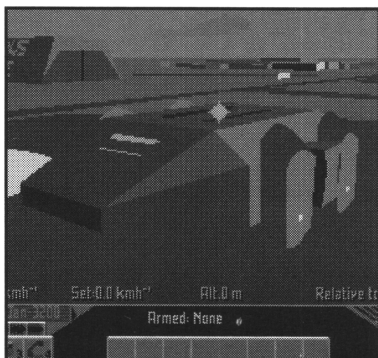
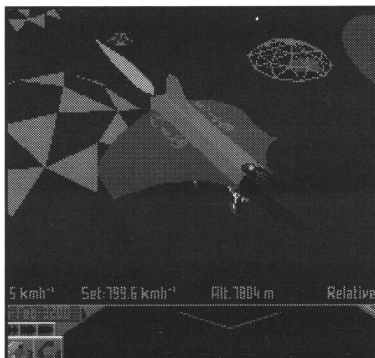
MAIN THRUSTER ACCELERATION 27 EARTH G

CREW 1

GUN MOUNTINGS 1

MISSILE PYLONS 2

ALLEGIANCE EMPIRE



PANTHER

HULL MASS 400 TONNES

MASS (FULLY LADEN) 2500 TONNES

INTERNAL CAPACITY (NO DRIVE) 2100 TONNES

RETRO THRUSTER ACCELERATION 3 EARTH G

MAIN THRUSTER ACCELERATION 6 EARTH G

CREW 15

GUN MOUNTINGS 4

MISSILE PYLONS 8

ALLEGIANCE FEDERATION

PUMA SHUTTLE

HULL MASS 175 TONNES

MASS (FULLY LADEN) 1000 TONNES

INTERNAL CAPACITY (NO DRIVE) 825 TONNES

RETRO THRUSTER ACCELERATION 3 EARTH G

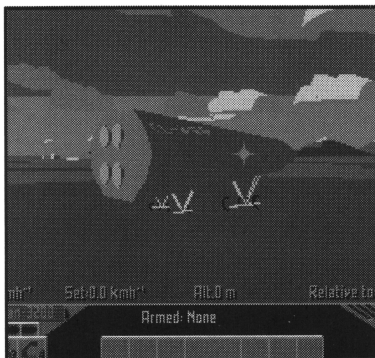
MAIN THRUSTER ACCELERATION 6 EARTH G

CREW 11

GUN MOUNTINGS 4+F

MISSILE PYLONS 8

ALLEGIANCE FEDERATION



PYTHON

HULL MASS 100 TONNES

MASS (FULLY LADEN) 500 TONNES

INTERNAL CAPACITY (NO DRIVE) 400 TONNES

RETRO THRUSTER ACCELERATION 4 EARTH G

MAIN THRUSTER ACCELERATION 10 EARTH G

CREW 7

GUN MOUNTINGS 2+F

MISSILE PYLONS 4

ALLEGIANCE INDEPENDENT

SIDEWINDER

HULL MASS 8 TONNES

MASS (FULLY LADEN) 33 TONNES

INTERNAL CAPACITY (NO DRIVE) 25 TONNES

RETRO THRUSTER ACCELERATION 12 EARTH G

MAIN THRUSTER ACCELERATION 23 EARTH G

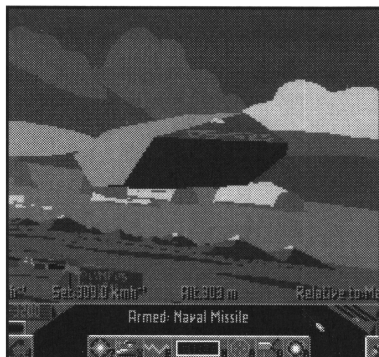
CREW 1

GUN MOUNTINGS 1+F

MISSILE PYLONS 0

ALLEGIANCE INDEPENDENT





TIGER TRADER

HULL MASS 80 TONNES

MASS (FULLY LADEN) 400 TONNES

INTERNAL CAPACITY (NO DRIVE) 320 TONNES

RETRO THRUSTER ACCELERATION 5 EARTH G

MAIN THRUSTER ACCELERATION 12 EARTH G

CREW 5

GUN MOUNTINGS 1+F

MISSILE PYLONS 1

ALLEGIANCE FEDERATION

TRANSPORTER

HULL MASS 40 TONNES

MASS (FULLY LADEN) 200 TONNES

INTERNAL CAPACITY (NO DRIVE) 160 TONNES

RETRO THRUSTER ACCELERATION 4 EARTH G

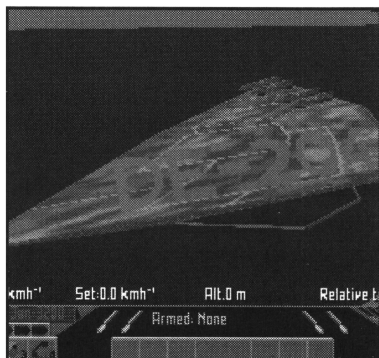
MAIN THRUSTER ACCELERATION 9 EARTH G

CREW 3

GUN MOUNTINGS 1

MISSILE PYLONS 2

ALLEGIANCE INDEPENDENT, FEDERATION



VIPER DEFENCE CRAFT

HULL MASS 15 TONNES

MASS (FULLY LADEN) 65 TONNES

INTERNAL CAPACITY (NO DRIVE) 50 TONNES

RETRO THRUSTER ACCELERATION 10 EARTH G

MAIN THRUSTER ACCELERATION 24 EARTH G

CREW 1

GUN MOUNTINGS 1+F

MISSILE PYLONS 4

ALLEGIANCE INDEPENDENT, FEDERATION, EMPIRE

KESTREL AIRFIGHTER

HULL MASS 5 TONNES

MASS (FULLY LADEN) 20 TONNES

INTERNAL CAPACITY (NO DRIVE) 15 TONNES

RETRO THRUSTER ACCELERATION 6 EARTH G

MAIN THRUSTER ACCELERATION 25 EARTH G

CREW 1

GUN MOUNTINGS 1

MISSILE PYLONS 2

ALLEGIANCE FEDERATION



HAWK AIRFIGHTER

HULL MASS 5 TONNES

MASS (FULLY LADEN) 18 TONNES

INTERNAL CAPACITY (NO DRIVE) 13 TONNES

RETRO THRUSTER ACCELERATION 6 EARTH G

MAIN THRUSTER ACCELERATION 27 EARTH G

CREW 1

GUN MOUNTINGS 1

MISSILE PYLONS 2

ALLEGIANCE FEDERATION

CREDITS

David Braben would like to thank the following for:-

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