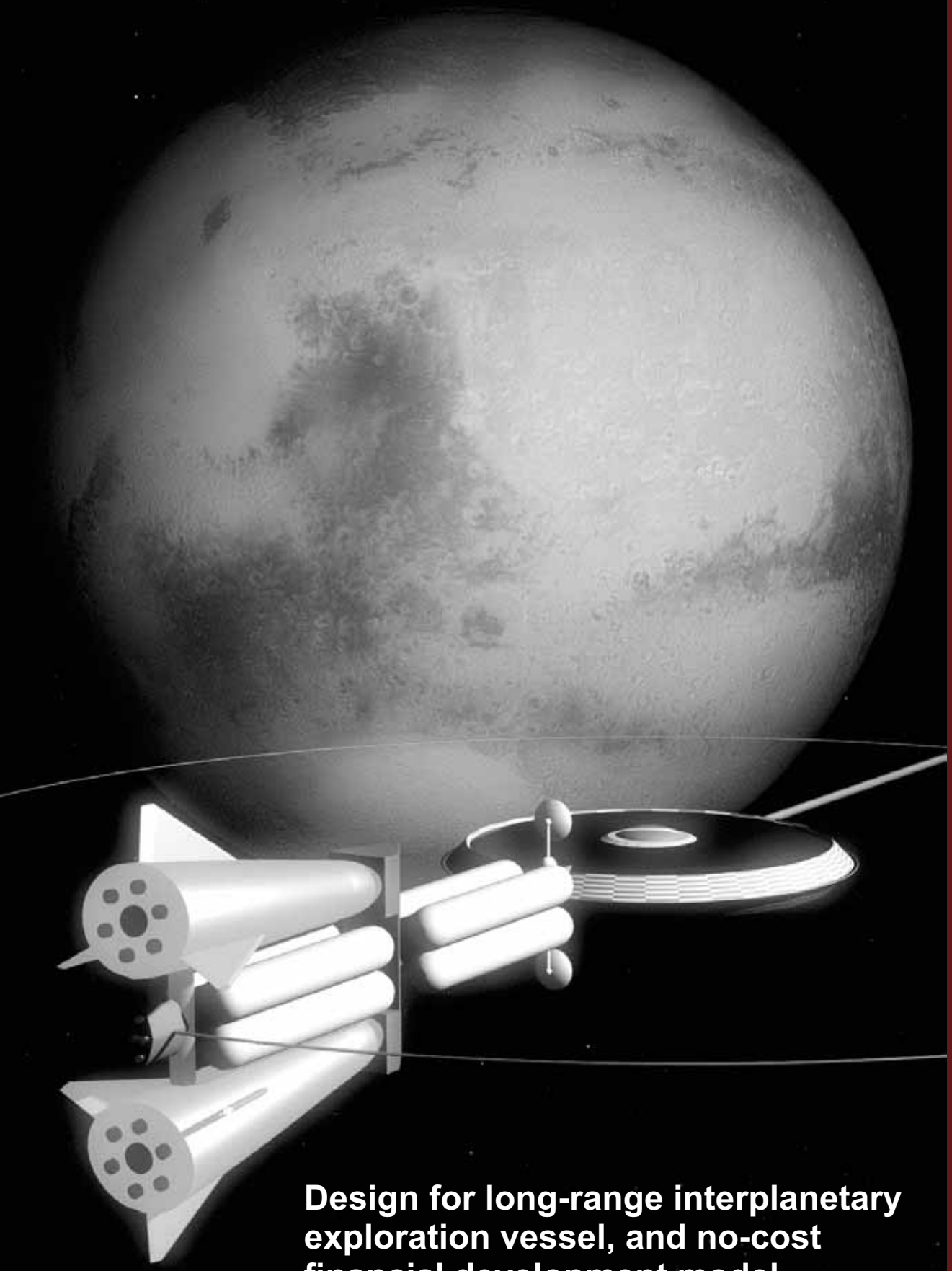
"First step Mars, and then the Stars!" - MB



SPRINGSHIP

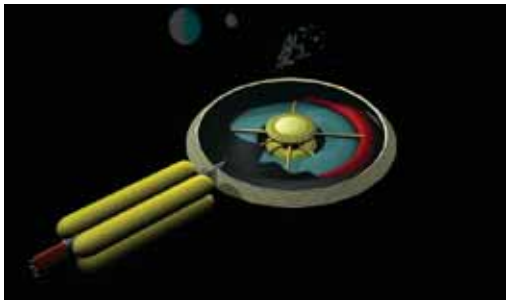
Design for long-range interplanetary exploration vessel, and no-cost financial development model.

by
Michael Bond

SPRINGSHIPS

Suggested design possibilities for long range interplanetary mission spaceships.

by Michael Bond



WELCOME onboard the SPRINGSHIP

This document proposes an outline design for an interplanetary spacecraft intended to:-

- Act as the basis for future long-range space exploration.
- Influence the future of spacecraft design, especially leading to high-speed interstellar craft.
- Revive the vision of man's future in space.

FINANCING The Future

Not discussed here is an underlying financial programme that will pay for this. This programme has solved the core issues of how to raise money for large-scale strategic projects at NO RISK to any participating subscriber.

This solution will remain commercially confidential while I seek the seed and development funding to launch it.

INTELLECTUAL PROPERTY RIGHTS

All intellectual property rights are asserted here by the writer, designer, inventor of the Springship and all of its components and operational features and methods. These rights include any likely copyrights, trademarks and potential patents.

Any attempt to seize or by-pass these rights will be dealt with appropriately and financial compensation and damaged sought from the infringing party.

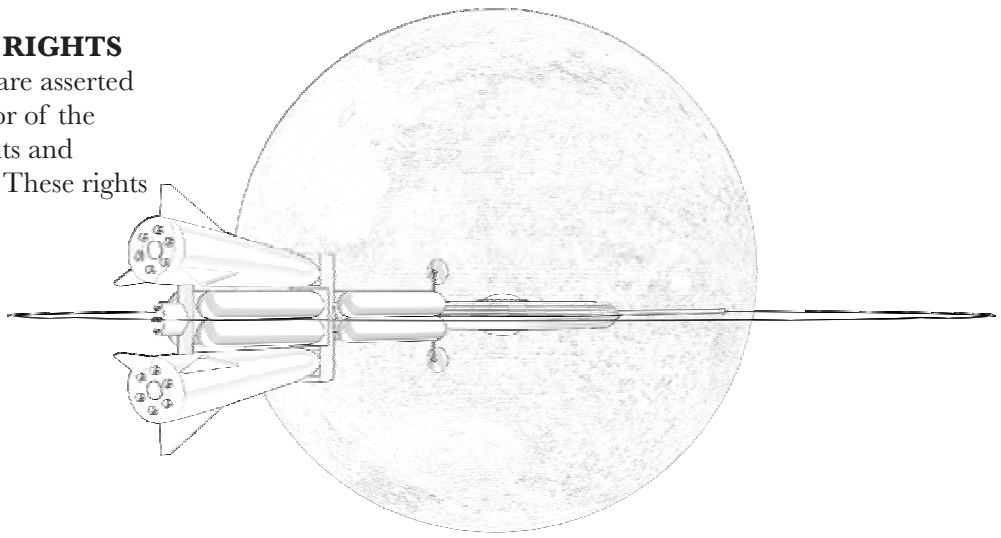
History

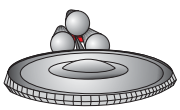
The design for the Springship has undergone numerous revisions over time and will undoubtedly continue to do so.

Additions and amendments have been added through new Appendices at the end of the original document.

My own design skills in interpreting the mental vision onto paper remain limited, but I hope you enjoy what you are about to read.

Michael Bond





Springship

SPRINGSHIPS

Suggested design possibilities for long range interplanetary mission spaceships.

by Michael Bond

- Use of Centrifugal forces.
- Resistant to long term flight damage.
- Pretty ship design.

Introduction - "Pulses" and "Springs"

Many years ago I wrote a short science fiction story called "Pulses". Part of the story had my leading character travel amongst a series of spinning ring space stations and a term I coined for them was "Spring Stations".

The term "spring" comes from the image of a spinning ring. A ring is used to create artificial gravity through centrifugal forces. I imagined that the term "spinning ring" would eventually shorten to "spring". A spring invokes images of life amidst the desert, a place of life, rest and relaxation in the midst of the barren desert of space. Ever since I have used the term to define any design of object, ring, cylinder, sphere that might use spin to create gravity.

"SpringShips" are a variant of this image for future space travel, and if I'm right you may soon see them sailing amongst the planets and stars.

Background

You are probably reading this because you already have some knowledge of and interest in the ideas of interplanetary, eventually interstellar, voyages. I also assume that you are aware of the dangers to human health of long journeys in freefall, without gravity to stimulate muscle and bone strength, making it difficult to travel far unless we find a way around this problem.

One solution is to go fast and reduce time spent in space. Another way is to create the effect of gravity en-route. Ideally we ought to be doing both.

The solution we have at our disposal with current technology is the use of spin forces to simulate gravity by rotating a portion or all of a spacecraft whilst on a voyage.

There have been various notable illustrations of the concept in science fiction and fact, but they don't seem to address other problems inherent in space travel - especially the threats from micrometeorites and solar radiation.

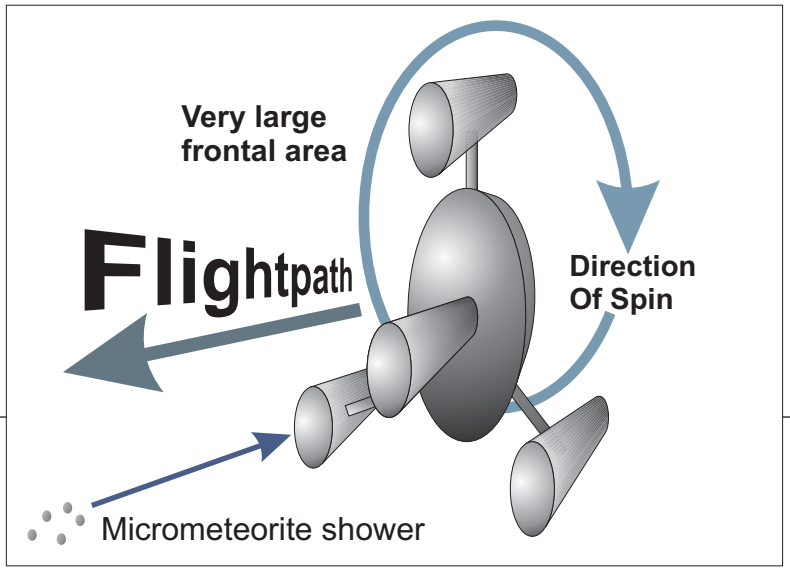
I believe a single form of vessel can be created to deal with all three problems: freefall hazards to human health, physical impact of micrometeorites and exposure to solar radiation during periods of solar flares - the SpringShip is that solution.

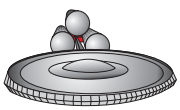
Design - A Disc

If we begin with the basic principle of the spring - a disc or ring shape - then we have another feature inherent in its shape which presents either a hazard or a help.

My earliest thought on the issue of ship design were concerned with the nature of the disc and its alignment. Whenever I saw other designs I noticed a tendency to adopt what I would call the "face forward" form of spacecraft.

In the "face forward" form the ship is spun along its axis to create spin, and gravity is





Springship

SPRINGSHIPS

Suggested design possibilities for long range interplanetary mission spaceships.

by Michael Bond

created in effect in one or more chambers or a ring on arms extending out from an axial core. As these arms are perpendicular to the axis and main body of the ship the end result is that the disc is presented face-onwards to the line of flight - presenting the maximum surface area to the front - not very healthy for the crew under any condition. *(see illustration on p.1)*

My solution to this was to tilt the ring or disc into an edge-onwards alignment. This alignment in turn automatically leads to the solution of the second problem. If a "face forward" position threatened the ship and crew from micrometeorites it could conceivably threaten them, at some points along their journey, to exposure from solar radiation. However, by tilting the ring into a horizontal position the design offered comparable protection to radiation as it does to micrometeorites.

Courses & Alignments

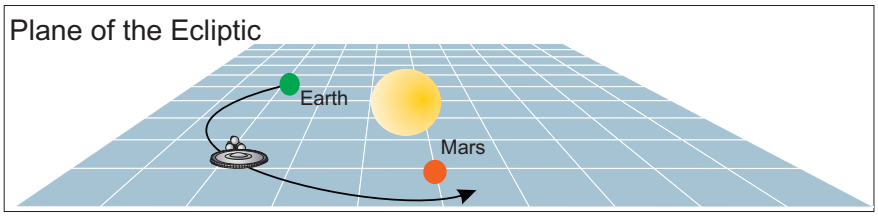
Most, if not all, journeys throughout the solar system will entail movement along the plane of the ecliptic - the horizontal plane on which the planets orbit the sun. This means that whenever following a course around the solar system a ship will, in most cases, present a side to the sun. By adopting this alignment the SpringShip becomes effective in dealing with solar radiation as only the edge of the ship is directly exposed to radiation and charged atomic particles emitted by the sun.

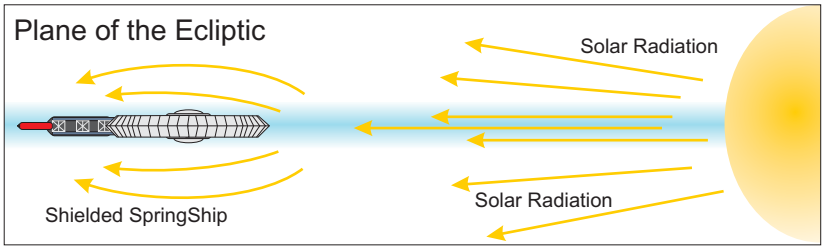
Shielding

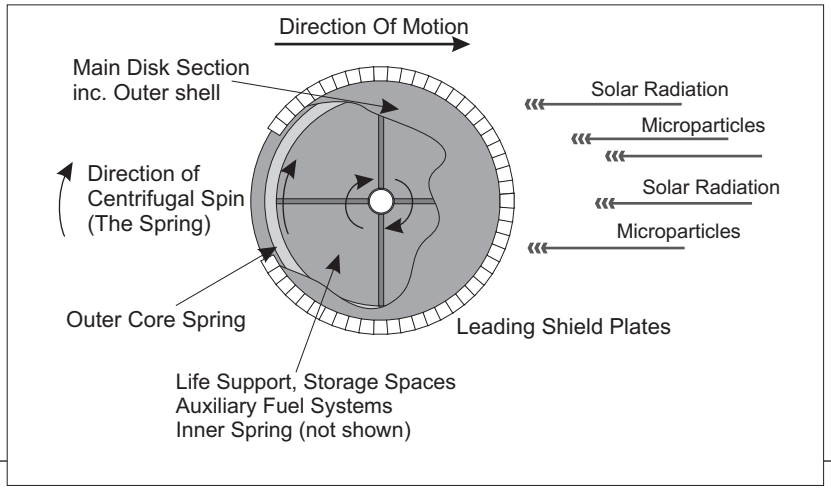
As my illustrations show there is a key benefit of an edge-on orientation for a SpringShip - only the edge has to carry the heaviest shielding.

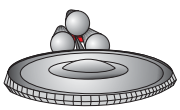
To shield a crew against both micrometeorites and radiation would require substantial weight of material. Whatever material is eventually adopted must be heavy and dense enough to deflect or absorb the impacts of micrometeorites and their effects on the structure of the ship, and absorb or deflect radiation from the sun.

I imagine that this shielding will eventually be a mixture of physical structure and electromagnetic forces. In a manner similar to the Earth's magnetic fields, a shielding field could be broadcast around the ship, conducted by shielding plates along the rim of the disc or aerials protected from the hull at key positions.





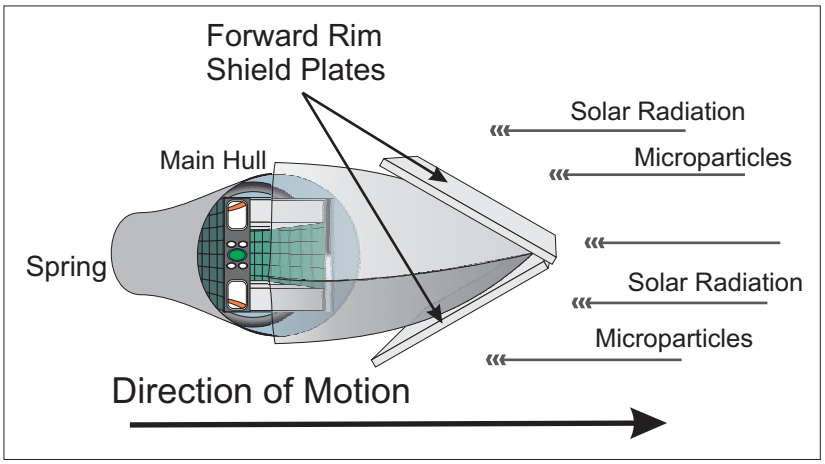




SPRINGSHIPS

Suggested design possibilities for long range interplanetary mission spaceships.

by Michael Bond



Construction

How do you build it?

A SpringShip has as its core feature a spinning ring to produce the effect of gravity for long term, deep space flight. That's going to be expensive, or so some people would say, so let's see what can be done about reducing some of the costs.

I have already proposed one cost saving - place the disc horizontally to the plane of the ecliptic and you can reduce the level of shielding required for frontal and side exposure to micrometeorites and solar radiation. Although shielding will still be required the amount of this material relative to the size of the vessel becomes much smaller when compared to shielding a "face forward" design - it is a small target area as opposed to large target area.

The main protective rim would be made of a series of simple protective plates, most likely based on Whipple shield plates to absorbs substantial long term damage from micrometeorites, with enhanced radiation resistance to solar space exposure.

Within this rim I would estimate that only a modest structural envelope might be required for a variety of technical purposes including: decoration, mounting solar panels for electrical generation, mounting radar and other sensory arrays, side shielding from minor impacts and radiation. etc., etc. This ought to be relatively easy to fabricate and build.

The Springs

There is one important feature of the ship that will require most of the effort on design and construction - the spinning rings. The springs need to deal with a number of issues, not least of them being reaction torque.

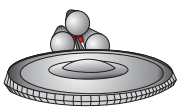
Torque

So, you have a ring spinning in space. That's all right when the ring spins on its own and you have set it spinning by some action such as small rocket jets. However, when you mount the ring inside a larger vessel you have to deal with torque - the counterforce that occurs when you cause the ring, or any wheel to spin in a direction.

You know how a helicopter works? When the main rotor spins one way the natural tendency of the fuselage is to rotate in the opposite direction in reaction to the mechanical forces used on driving the main rotor around. To prevent this most helicopters have an extended tail boom and small tail rotor to push against this torque. There is a way that this can be done onboard a SpringShip - a second ring.

Two Rings

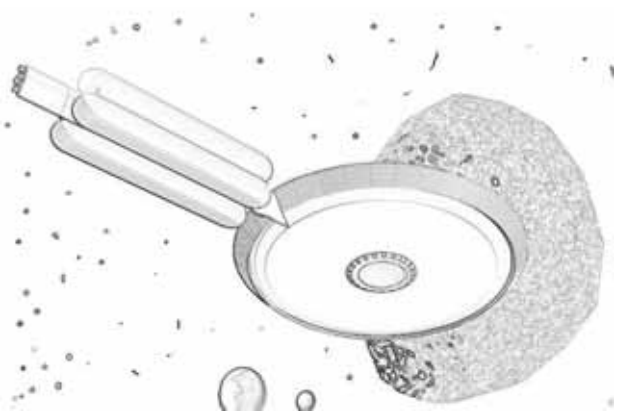
To counter torque a SpringShip has two

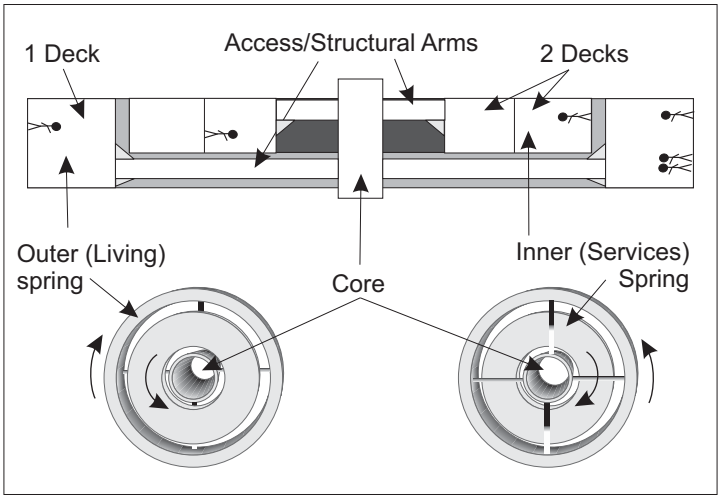


SPRINGSHIPS

Suggested design possibilities for long range interplanetary mission spaceships.

by Michael Bond





main rings rotating in opposite directions. They don't have to be the same size, only the same mass and force on the common axis they would share.

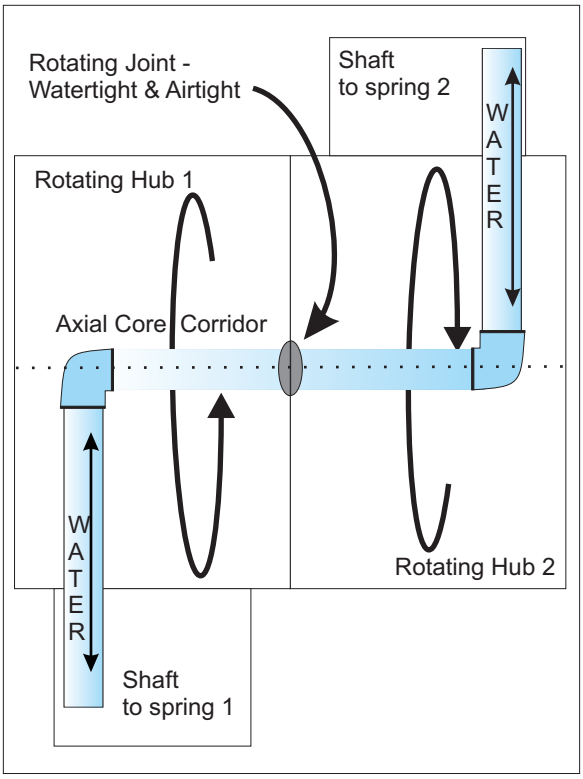
With the freedom to vary the size of the rings the obvious solution to saving on space and weight is to have one ring smaller and seated inside the circle of the other. While the larger rings of a SpringShip would be used for accommodation and working spaces around the outer rim of the ship, a smaller ring would rotate nested inside the space closer to the axis. The key to saving weight and cost is in reducing the length of axis required to serve both rings, shortening the circumference of the inner ring and shortening its support arms, etc.

Balancing The Torque

Although the two rings exist to counter the effects of torque on the ship their masses also have to be balanced to prevent the ship drifting out of alignment.

One way (illustrated here) is with a mass of water stored in the two rings, transferred from ring to ring when needed to adjust mass for added people, supplies, machinery.

This requires suitable pipes moving water through the axis. These pipes must retain an air and water seal tight against any leakage when they are in use, and the ability to flush them dry when not needed, to prevent leakage when not in use.



Further thoughts on this, and alternative viewpoints are discussed on page ten (p.10).

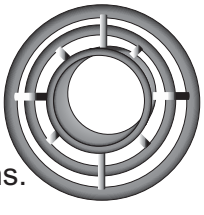
Constructing SpringShips

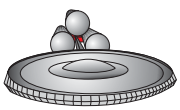
How do you save money on construction costs, after all such rings require substantial engineering, lots of time to design, construct the components, assemble in space, all the man hours, all the resources, right?

Well, perhaps not.

A very quick, and simple way to create and build a ring for a SpringShip is to use an inflatable tube just like a bicycle inner tube.

"Inflatable Tube" Springs.
Simpler to assemble for first generation ship designs.





Springship

SPRINGSHIPS

Suggested design possibilities for long range interplanetary mission spaceships.

by Michael Bond

Such a tube can be constructed on Earth in one unit, packed for shipment and inflated into position in just a few hours. Compare that to the idea of assembling a pair of rigid structural rings over several weeks or months.

The properties of this tube can be very beneficial to spacecraft design and construction. The shape of the tube is predetermined. The inflation of the tube will automatically make it rigid when in space. Modern materials will easily allow for the construction of a tube resistant to micrometeorite impact, and will be flexible enough to absorb far more shock than a rigid structure.

Once the tube is inflated similar tubes are attached to form the structural arms joining the ring to the axis.

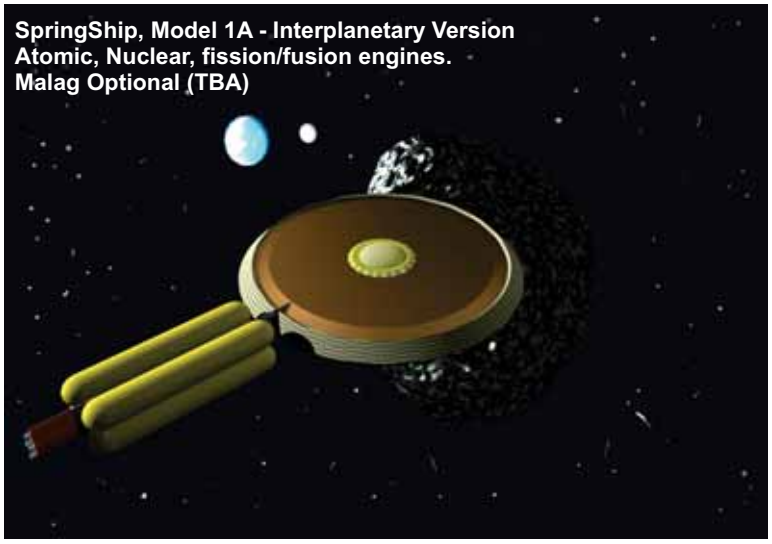
To provide all the normal working and living spaces within this tube you can fit some elements beforehand, such as flexible cabling and piping, and install the reminder in a series of simple support frames attached to hoops on the inside of the ring. This allows for the fitting of a rigid decking and other structures. However, unlike the construction of a solid ring these will be of lightweight composite materials designed to pack small, unfold big and stay solid under prolonged use.

Propulsion

A SpringShip will be the product of a substantial investment, and it's going to be a complete waste of time and money unless comparable effort is made on a suitable means of propulsion.

Although chemical rocket motors have been accepted for decades this situation will not remain for much longer. Advances in engine technology and control of forces mean that the next generation of craft and their propulsion will use magnetic, atomic and/or nuclear motors as a matter of course.

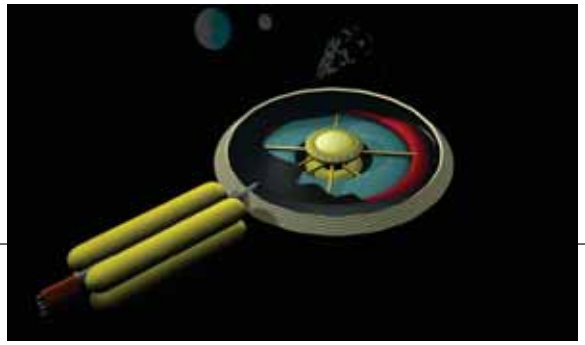
The use of such forces means a faster vessel, longer ranges for a given load of fuel, heavier loads of freight and ship mass for a given journey, shorter durations for near-solar journeys (Mars, et al), reduced requirements of excessive loads of life support (food, water, etc) for crew, and the savings in costs from such shorter journey times.

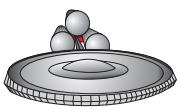


Quite simply a magnetic/atomic/nuclear option has a vastly more cost-effective chance of commercial success than first generation chemical rocket technology.

Design Options

So what sort of designs can be produced with a SpringShip?





SPRINGSHIPS

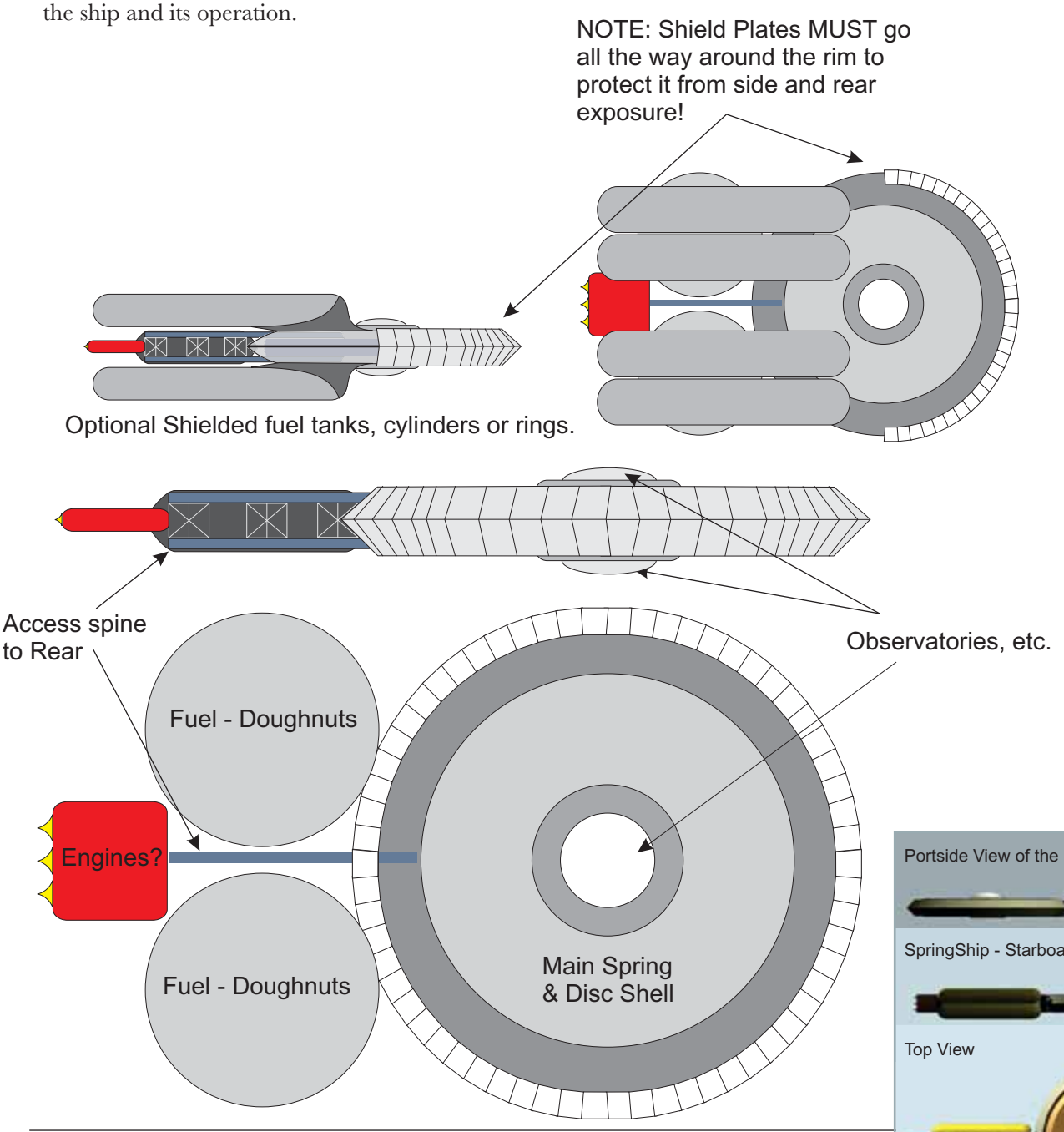
Suggested design possibilities for long range interplanetary mission spaceships.

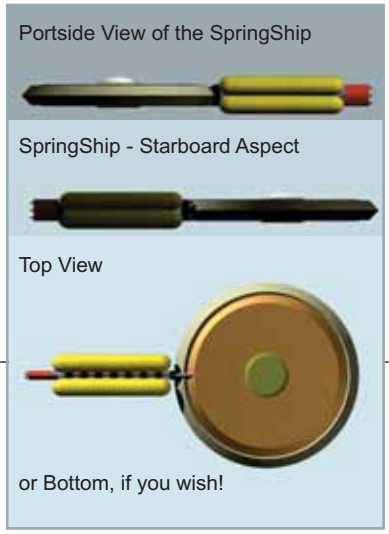
by Michael Bond

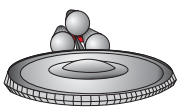
Key Components

Here is a brief description of some possible key components to go into a SpringShip.

NOTE: See Appendix 1 onwards for the latest variants and improvements in designs for the ship and its operation.







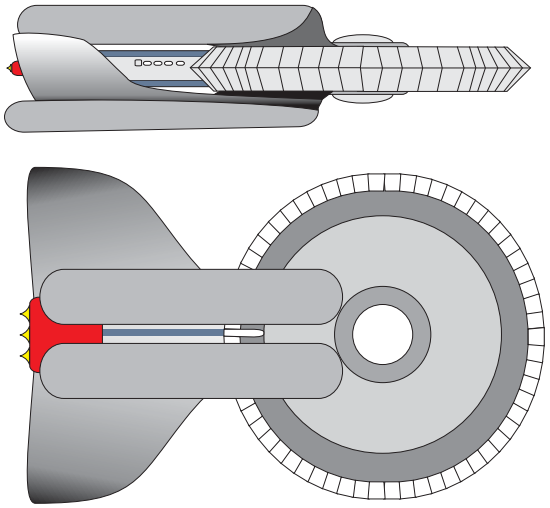
SPRINGSHIPS

Suggested design possibilities for long range interplanetary mission spaceships.

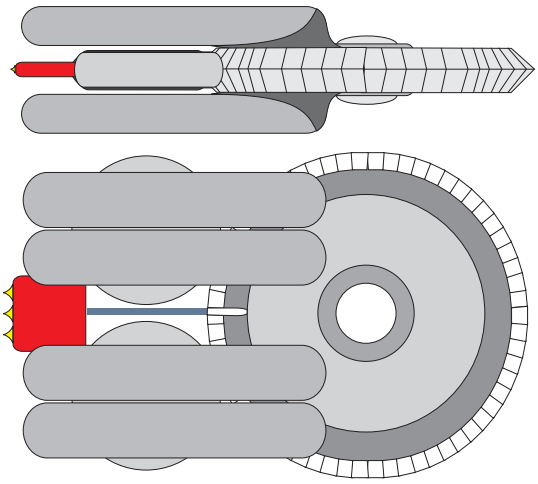
by Michael Bond

Speculative Design Configurations

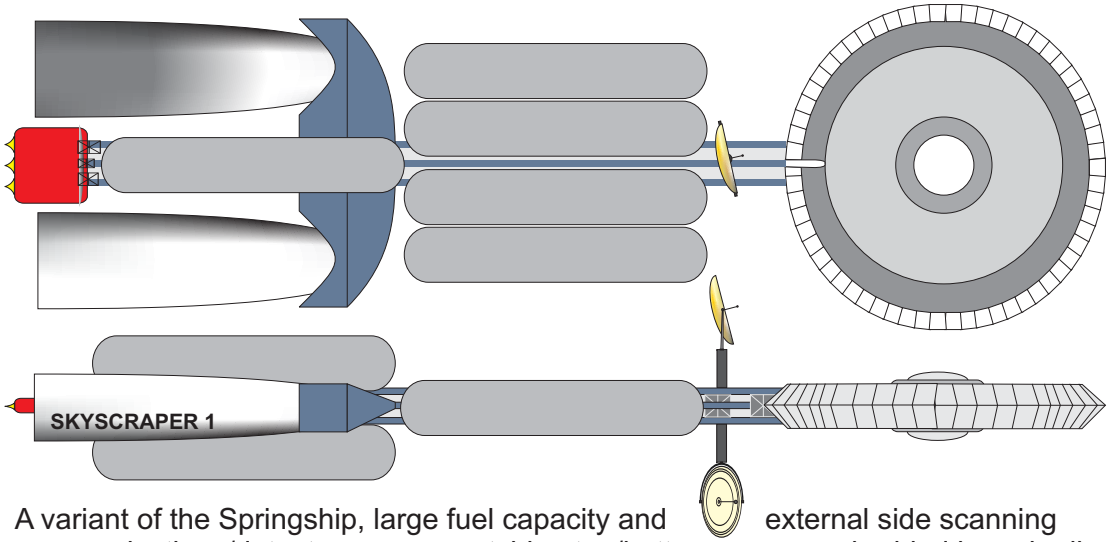
Here are three options for possible designs based on available resources and the kind of voyages you want to undertake.



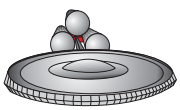
If you want a partially aerodynamic form for aerobraking or other manoeuvres then try this little option.



Optional Shielded fuel tanks, cylinders or rings.



A variant of the Springship, large fuel capacity and external side scanning communications/detector arrays, matching top/bottom arrays embedded in main disc shell. Two auxiliary “Launch” ships (”Skyscraper” designs) act as surface landing craft, lifeships, secondary engines and fuel tanks, resupply craft, etc.



Springship

SPRINGSHIPS

Suggested design possibilities for long range interplanetary mission spaceships.

by Michael Bond

Other Features

1) Axial Core Design

The axis has three sections - top, bottom, central. Top and bottom sections comprise of docking chambers for landing ships, lifeboats, excursion vehicles, etc.

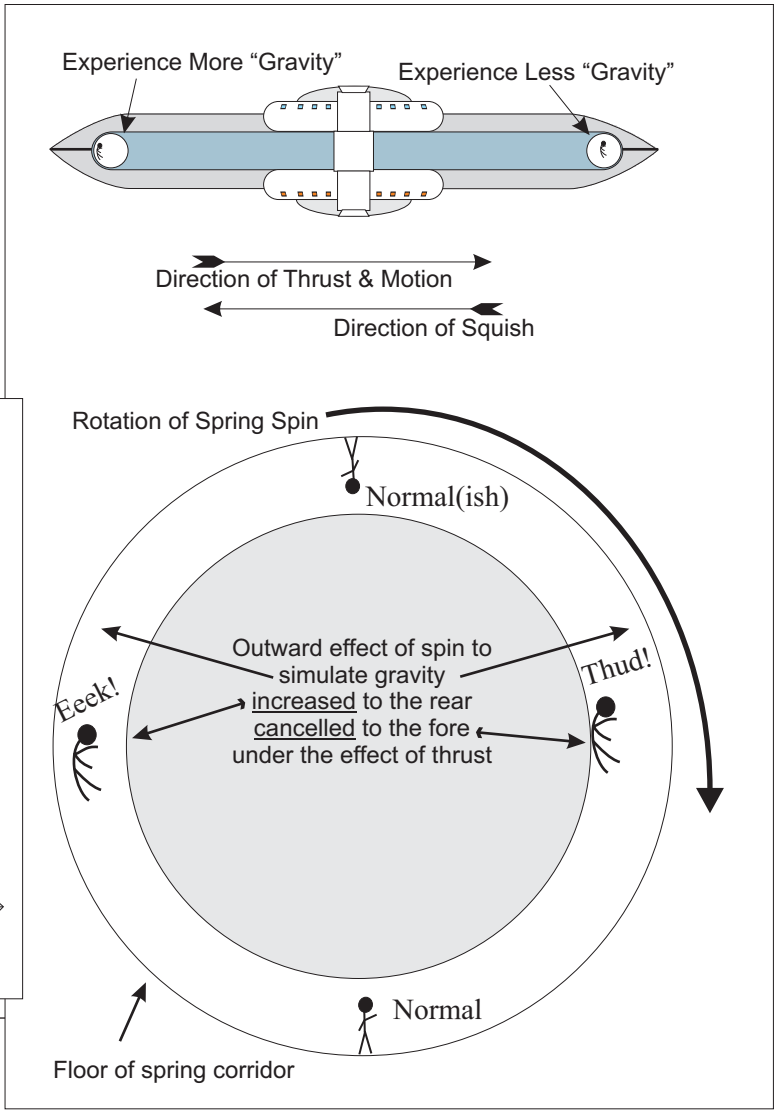
Around this is a freefall ring of chambers isolated from the main ship against damage, intrusion, infection, etc. All sample return missions deliver to these chambers NOT into the main springs or human occupied sections.

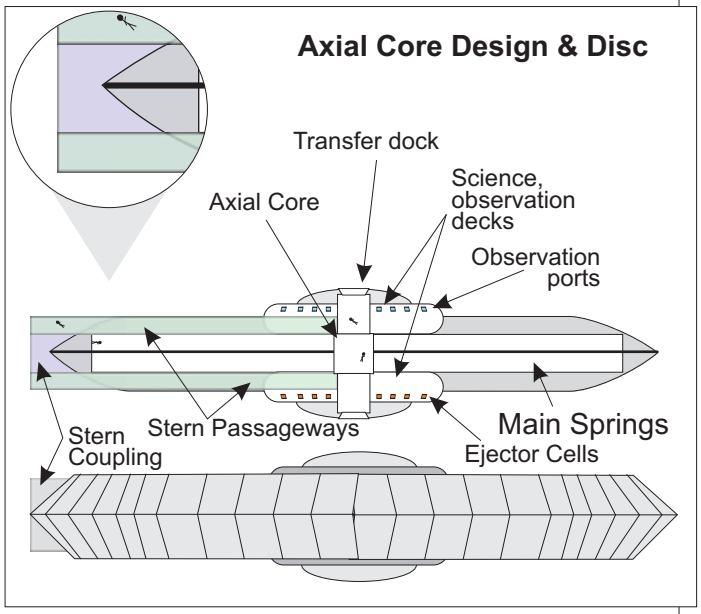
In this layout the top section is for science activities and observation work, while the bottom section is for sample laboratories. In this case the samples are always stored in isolated cells against the external hull. These cells can be ejected in the event that containment is breached (escaping Aliens, etc.).

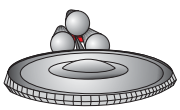
2) Rollercoaster In Thrust

The SpringShip is not perfect, and one aspect of this is the effect of thrust on the experience of crew occupying the rings. Under acceleration thrust the centrifugal effect in the ring is reduced or cancelled by the motion of the ship, creating a rollercoaster effect on anyone occupying the rings during this period, as they first experience heavier "gravity" then lighter "gravity" then back to heavier.

This can be dealt with by limiting the strength of thrust, such as via ion/magnetic propulsion, over prolonged periods of acceleration, or by using short intense bursts of thrust to attain high speed, while the crew occupy acceleration areas in central axial cabins or the attached auxiliary ships.







Springship

SPRINGSHIPS

Suggested design possibilities for long range interplanetary mission spaceships.

by Michael Bond

Other Features

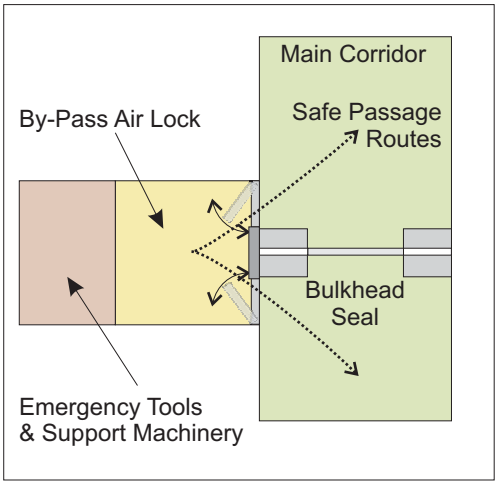
3) Bulkhead By-Pass Airlocks - Safelocks

A typical theme of some fictions is the danger of being locked inside a damaged section of your ship, the bulkheads closed against flooding of a ship or loss of air in a starship.

To solve this a SpringShip supports small emergency by-pass airlocks at each bulkhead.

In the event of an emergency, when the main bulkheads are sealed, through loss of air, fire, other events, a small locker in the side of the corridor functions as an emergency refuge, an airlock to escape the damaged section of the ship and a storage for emergency tools, supplies, machinery, etc.

For example, the emergency locker can hold spare spacesuits, security and disaster monitoring controls for cameras and public address systems, fire-fighting equipment, spare parts, tools, first aid, food, air, water, etc.

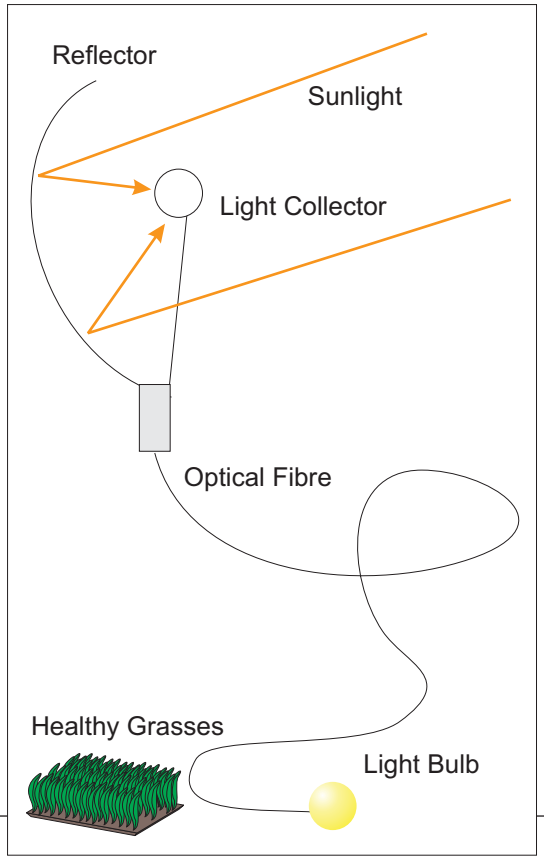


These lockers allow several people to move quickly and safely through from a damaged section into a safe one. This means a locker must have enough emergency air to support many people passing through quickly and allow a major loss of air when it's necessary to save time, rather than going through the normal process of evacuating air when you move into a vacuum.

An emergency locker is design to save lives on long range space vessels when there is no hope of outside assistance.

4) Sun lighting

A way to illuminate the interior of the Springship is through the collection of sunlight on external reflectors that focus light into collectors and along optical fibres, possibly through mirrors to enter the rings, and out through "lightbulbs" into key parts of the ship, especially its internal gardens and farm for healthy long term food supplies.



SPRINGSHIPS

Suggested design possibilities for long range interplanetary mission spaceships.

by Michael Bond

Other Features

5) Balancing Torque and Disc Layout

Earlier in this document I briefly mentioned one rudimentary way to balance the effects of torque on the ship, by moving masses of water between the rings.

However this is not an essential feature of the ship's design if the two counter-rotating rings are disconnected physically from the core and the main structure of the ship once they are spun up.

This can be achieved by using magnetic rings to connect the hub of the springs to the axis. Such magnetic rings allow a force to be applied to the springs to spin them, and remove any direct physical connection once spun.

Another issue that occurs in any vessel of a reasonable size is the problem of mass moving uncontrolled around the ship - the crew.

Should the crew gather in one part of a ring, or any large mass shift to one side of a ring, it sends the axis of the ring out of alignment from the core axis of the disc. This increases the problems of vibration against the axis core when the ring "wobbles" away from the central axis.

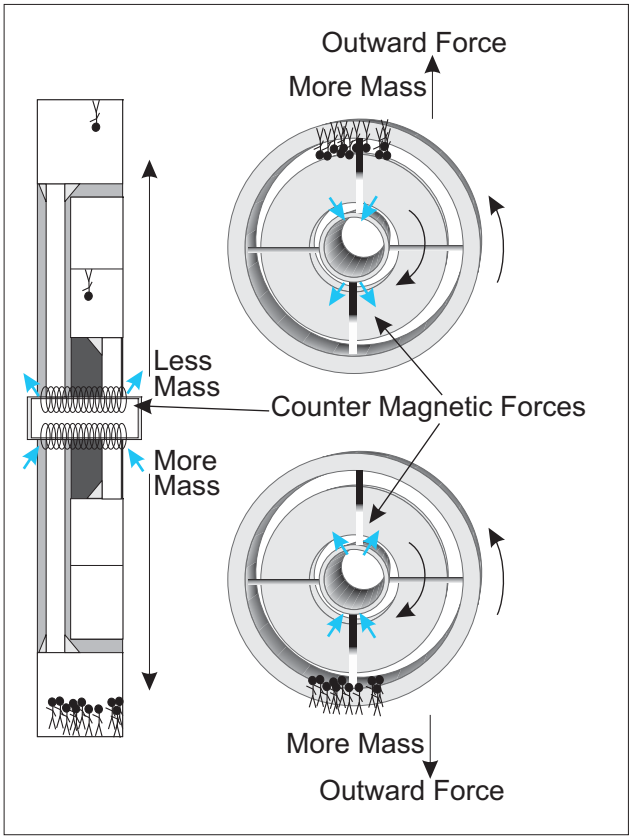
From the point of view of the crew this will be unnoticed - they continue to feel the effects of local "gravity" in the ring; but at the core axis the ring will rub against the axis unless it's imbalance is smoothed out.

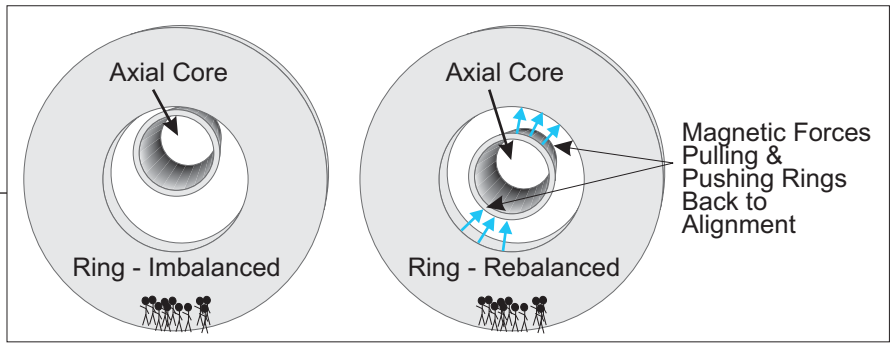
The magnets will achieve this.

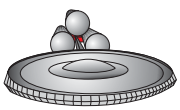
Using the same magnetic forces that help spin the rings up, any imbalance of a ring's axis, when there is more mass on one side than the other, will be countered by applying the magnets rapidly to counter the shift in mass and push the ring back to centre.

As the ring spins around the core the central magnets will act to either force the hub of the ring away from the axis or attract the other side of the hub back towards the axis.

Unfortunately regular movement of mass around the ship, and the resulting counteraction onboard, will send vibrations around the ship, with the potential to disturb any delicate observations, laboratory experiments, etc. But that's for another solution.







SPRINGSHIPS

Suggested design possibilities for long range interplanetary mission spaceships.

by Michael Bond

Future Speculations

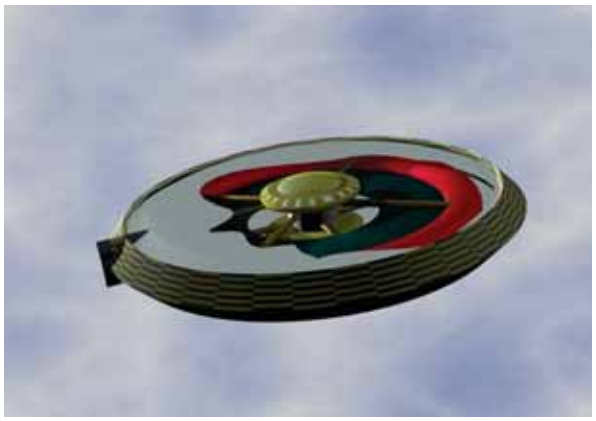
The SpringShip is not just a short term design proposal for the immediate future of long range space exploration. As science and technology progresses the concept will become suitable for a number of other applications - there will be more flexibility in its design and more opportunity to deal with many more kinds of environment, mission, etc.

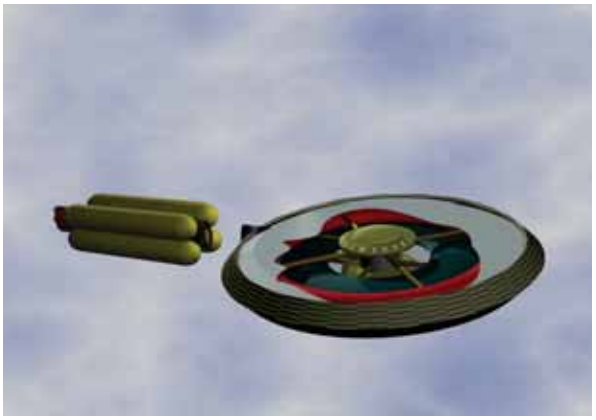
One possibility to build into the design right from the beginning is for the dismounting of the disc from the engine/fuel tender. This permits the tender to be swapped at short notice, such as to carry out a fast transfer of main load from one tender to another - especially important if you have an urgent consignment needed in one place and want to refuel very quickly - just dump the tanks and collect a whole new tender with new engines, and life support supplier. I am sure the military (and Hollywood) will soon see the practicalities of such a practice.

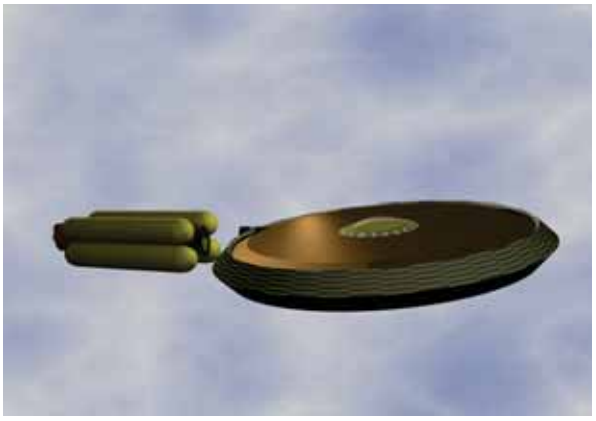
As technology progresses further then opportunity will come for the disc to make a landing. This is likely to come about as ion and plasma technologies improve to the point of being able to land a craft in atmosphere (it won't work on the moon - just add rockets?).

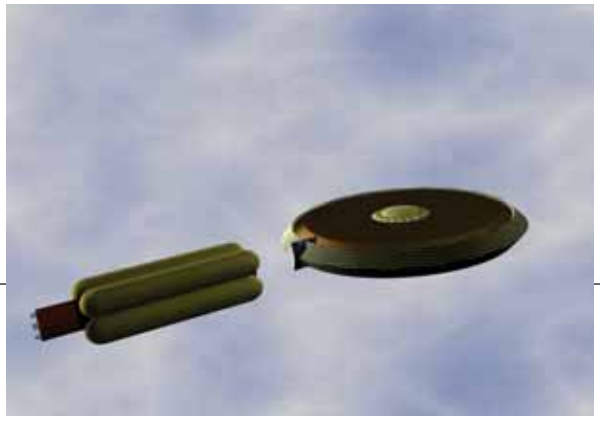
If the disc and tender style remains in the long term then you have the design basis for an effective landing craft to reach the ground whilst leaving a more substantial auxiliary vessel in orbit, eventually complete with its own accommodation and other facilities - two ships in one.

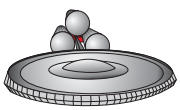
Once mankind masters gravity the idea of the springs within will be replaced with a "true" flying saucer....?











SPRINGSHIPS

Suggested design possibilities for long range interplanetary mission spaceships.

by Michael Bond

About The Writer

Michael is a long term science and technology, media and arts, business and finance enthusiast and professional. His background has taken him through many occupations and experiences, ranging through short film production, computer consultancy, to the founding of two companies, in media production and specialist international finance.

Following a year's work at Manchester University's Business Incubation Centre in 2001 he has founded a company to offer international traders secure transaction accounts to prevent international trading fraud. The service also improves the management of large-scale financial projects.

His current activities include pursuing the dream of a manned mission to Mars, and establishing his finance business as the premier financial security organization for worldwide trade services. This business will become the base for all financial management of the huge project funding required for his ambitious technological dream, offering full security for all backers, subscribers and members.

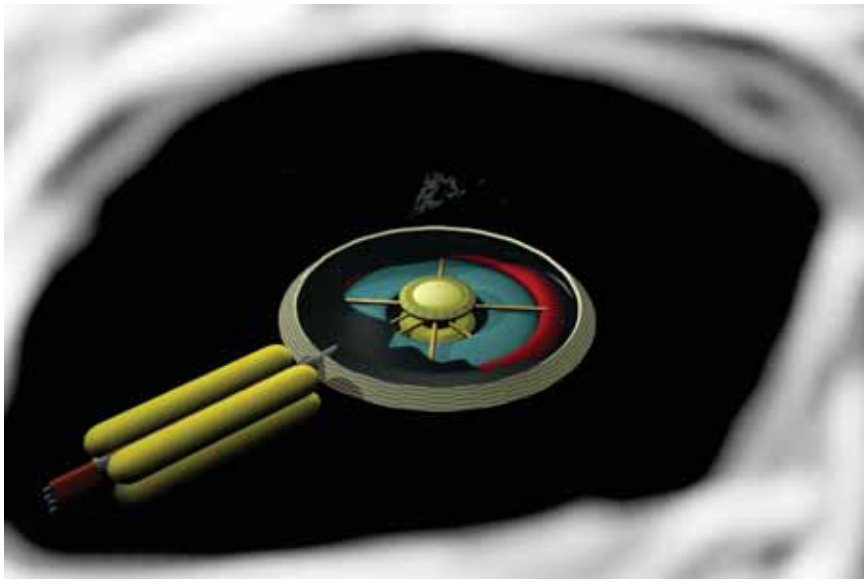
Contact:-

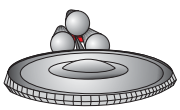
You can contact Michael at:-

http://www.worldmaker.org

First edition (2002).
1st revised and up-dated in 2009, Appendix 1.
2nd revised & up-dated in 2011, Appendix 2.

"A dream to be fulfilled, let's put our mind to the task, and build."





SPRINGSHIPS

Suggested design possibilities for long range interplanetary mission spaceships.

by Michael Bond

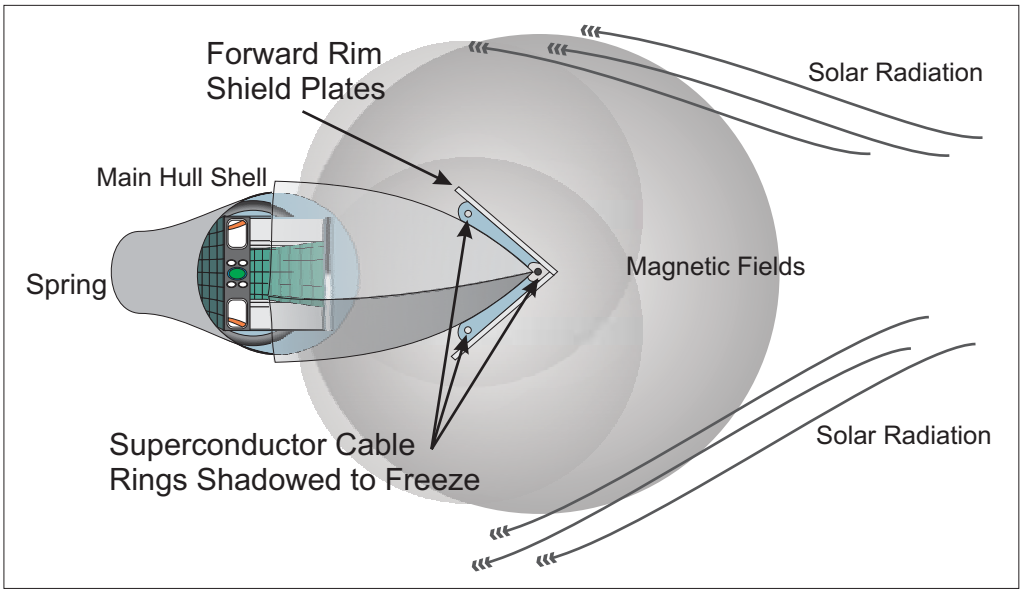
Appendix - 1A
yr2009

Superconductor Magnetic Shielding

A question I have not addressed in the main proposal for the SpringShip design is how best to shield the crew against radiation in solar space.

The most effective way is through magnetic fields that copy the shielding effect of the Earth's magnetic field, but the big question is how best to project such a field outside the ship.

The answer is to use superconductor cables for the generation of a suitably strong field.



The problem with most superconductors is how to keep the coil for such a magnet cold; but in the shadows of space cold is easy to find.

This is where I have adapted the design of the shielding plates on the SpringShip. While the plates serve as physical shields for micro-impacts they also shade the rim of the ship, placing that part of the SpringShip into deep shadow, and the deepest cold of space.

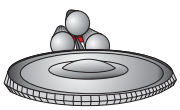
Superconductor cable coils can be placed around the outside of the main disc shell underneath the plates. Protected from exposure to the sun's heat, the cables will be kept in deepest possible cold, enhanced where necessary by a mixture of cooling radiator vanes and small quantities of liquid helium.

Here the cables can perform to maximum efficiency and project a strong field far outside the ship. Multiple cables offer protective redundancy and overlap above and below the disc section for greater deflection of radiation.

With the advent of higher temperature superconductors, able to function at only 200 degrees F. it will become possible to create such fields and offer crews the safety of long voyages in deep space.

However, the development of high temperature superconducting materials will still be necessary for ships and stations operating closer to the sun.

Another element that has to be considered is



SPRINGSHIPS

Suggested design possibilities for long range interplanetary mission spaceships.

by Michael Bond

the field strength of the magnetic shield needed to deflect solar, and other, radiation. The SpringShip already presents a very small edge-on profile, so very little surface is directly exposed to solar radiation, but that radiation still has to be deflected away from the core of the ship - the accommodation.

To deflect radiation you need either a very strong magnetic field placed close to the ship's hull, producing a high deflection angle in the radiation's path, or a weaker magnetic shield further out, producing a smaller deflection angle for the radiation's path but still ensuring the radiation's path does not touch the accommodation disc (illustration A.).

Do this by adding an outer shielding ring (illustration B.). The super-conductor cable is placed in a small, strong, heat-resistant circular pipe supported by extended booms ahead of the ship and possibly fixed to the stern - out of the immediate heat effects from the ship's engines.

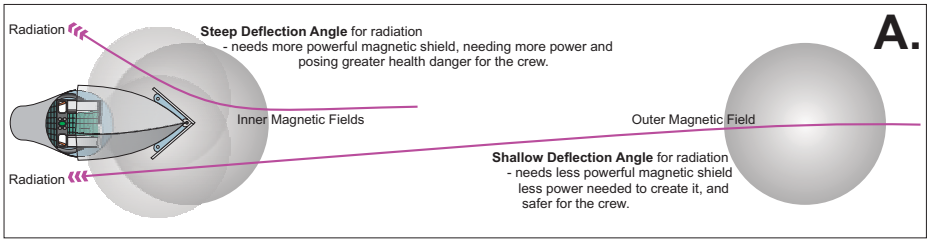
This outer shield acts to deflect some of any radiation approaching the ship's disc. A small deflection at this point will reduce the amount or radiation reaching the disc, and begin deflecting the rest of the radiation.

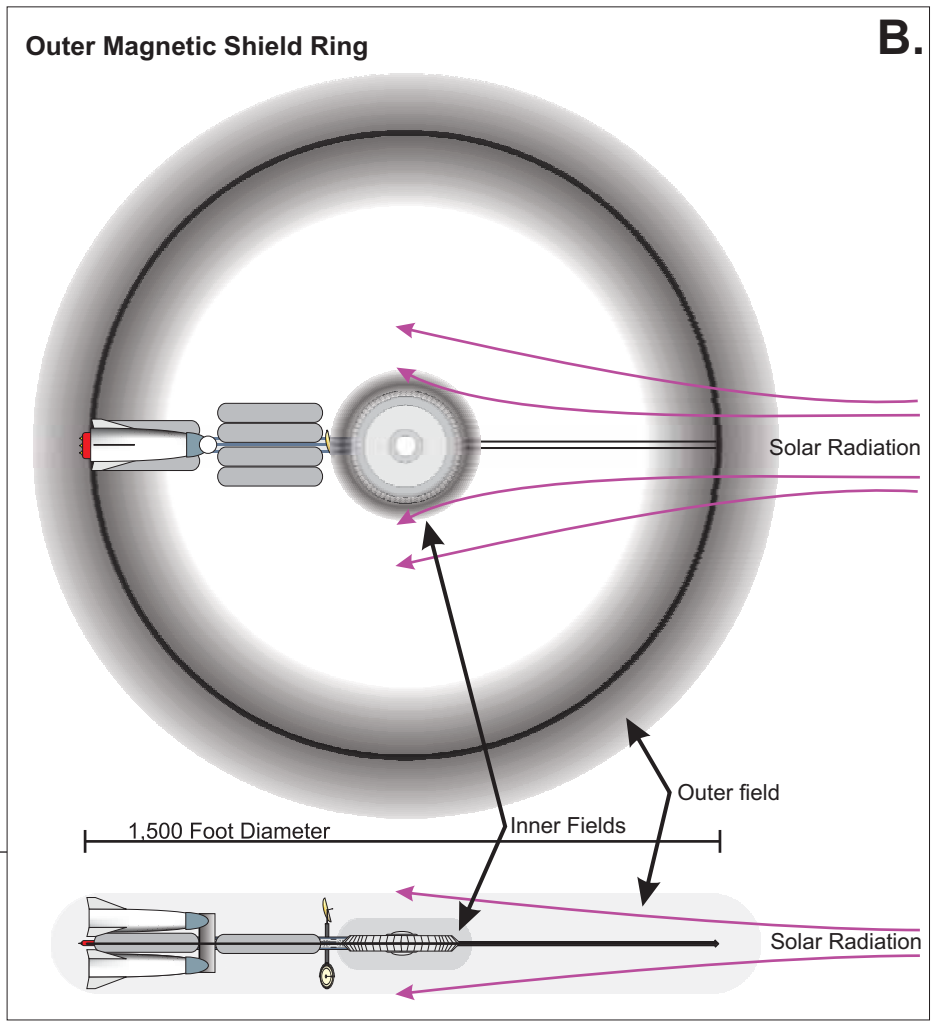
When this partially-deflected radiation reaches the inner magnetic shields around the edge of the disc section of the ship, it is already on an outbound path. The inner shields then completes the deflection and turns all remaining radiation aside, or reduces the amount of radiation reaching the accommodation to an acceptable level.

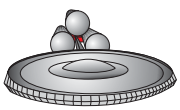
This multi-layered approach to radiation shielding does not work on radiation approaching the ship from above or below, unless another shielding array is placed in those positions.

Appendix - 1B
yr2009

[This shielding proposal is based on the work of Franklin Cocks in proposals for the use of magnetic shields for the moon, published in Analog magazine, Jan. 2007]







SPRINGSHIPS

Suggested design possibilities for long range interplanetary mission spaceships.

by Michael Bond

Appendix - 1C
yr2009

Spring Gangways

How to cross from one spring to another, when you have them arranged in multiple, nested layouts onboard Springships.

This is a comfort and convenience for any member of the crew wanting to cross quickly from one spring to another, without the inconvenience and waste of time travelling through the axial core of the ship.

Have a gap between the nested springs, the inner one small enough from the outer one to leave a 10-15 foot space.

Inside this space and anchored to the support arms you place a gangway, one suspended "under" the inner spring and one mounted on "top" of the outer spring.

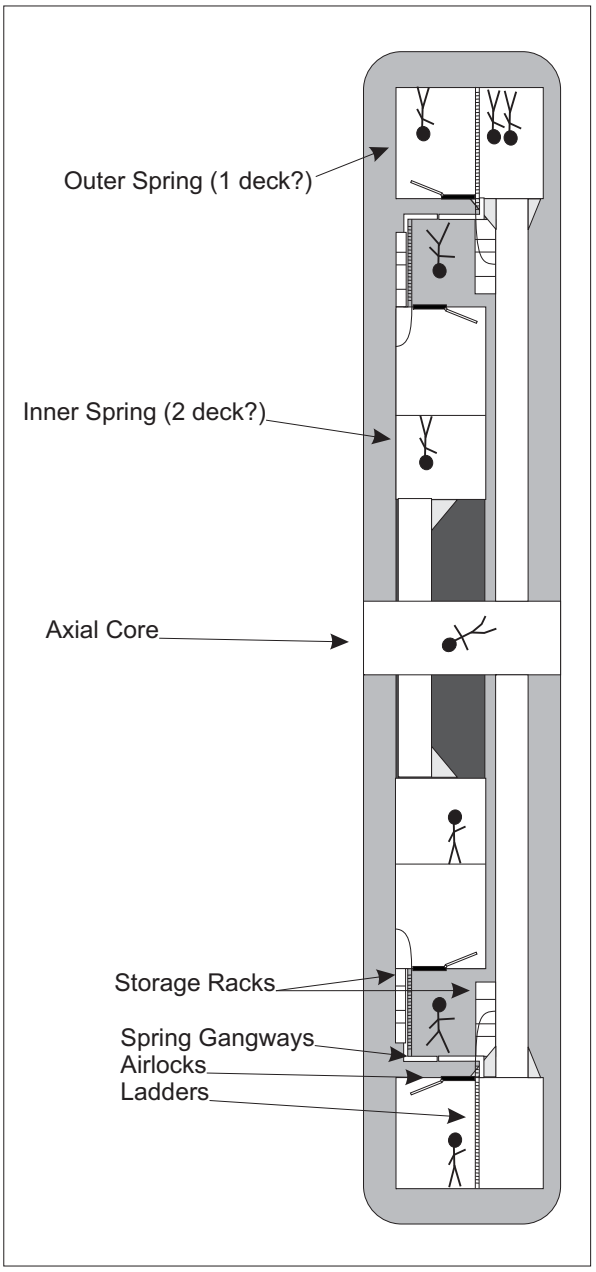
Access to the gangways is through a ladder and airlock/hatch adjoining the arm, the only rigid part of a spring's structure (the rest of the rings is inflated fabric).

These gangways are placed level with each other, leaving a small gap between them, so that as the rings spin the gangways move past each other in opposite directions.

As the rate of the spin is always likely to be small it is easy to step or jump from one gangway to the other.

Additionally, the rigid nature of the gangways and their support arms, means that they can be used at structural supports for the rings, similar to I beams assembled around the inner and outer rims of the rings. This is a secondary support only, but adds another form of safety when needed.

Don't waste this space though. As the gangways are more likely to be used by crew, NOT PASSENGERS, they can hold racks/ cabinets of emergency supplies, spare parts, tools, and much more, along the sides of the gangways, while leaving a clear space in the middle for crossing.



SPRINGSHIPS

Suggested design possibilities for long range interplanetary mission spaceships.

by Michael Bond

Appendix - 2A
yr2011

Ships Docks

There are three topside and three underside locations where Springships, their Launches and other vessels may dock safely.

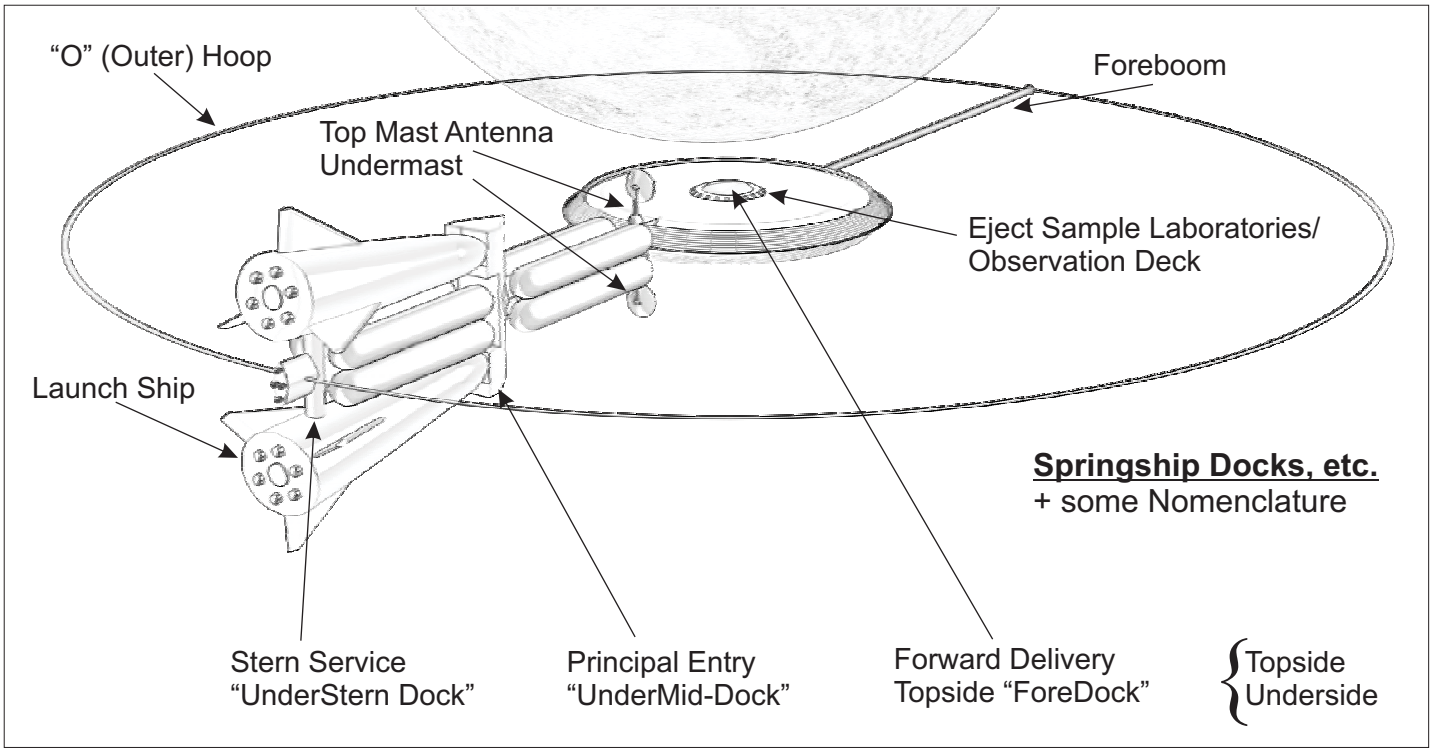
Each serves a different, discreet function and contraints will be placed to prevent amateurish (Hollywood-style) abuse and damage to the ship's normal safe function and security.

The three locations are:-

(2) The Principal Entry Dock

This is the first point of entry for all crew, supplies, visitors and passengers. It has a wide range of docking, access and security functions, including appropriate security scanning against criminal or terrorist access. There is no direct access to the rest of the ship unless you have successfully passed all security checks, both manned and automatic.

Its distance from the main accommodation disc offers another level of security.

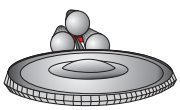


(1) The Stern Dock

This is reserved only for engineering maintenance of the ship's stern, to gain direct access to the Launches' sterns and to brace the tail of each Launch Ship onto the Springship when on long voyages. It also serves as a primary conduit for fuel and other volatile supplies between two vessels.

(3) The Froward Delivery Dock

This contradicts some of what I've just said with the Principal Dock. Direct access to thee core accommodation of the ship is possible from this point, but is typically only to be used by crew and for sample return trips as it gives direct access to the external laboratories ringing the dock at top and bottom of the disc section.



Springship

SPRINGSHIPS

Suggested design possibilities for long range interplanetary mission spaceships.

by Michael Bond

Inter-Ship Docking

Appendix - 2B yr2011

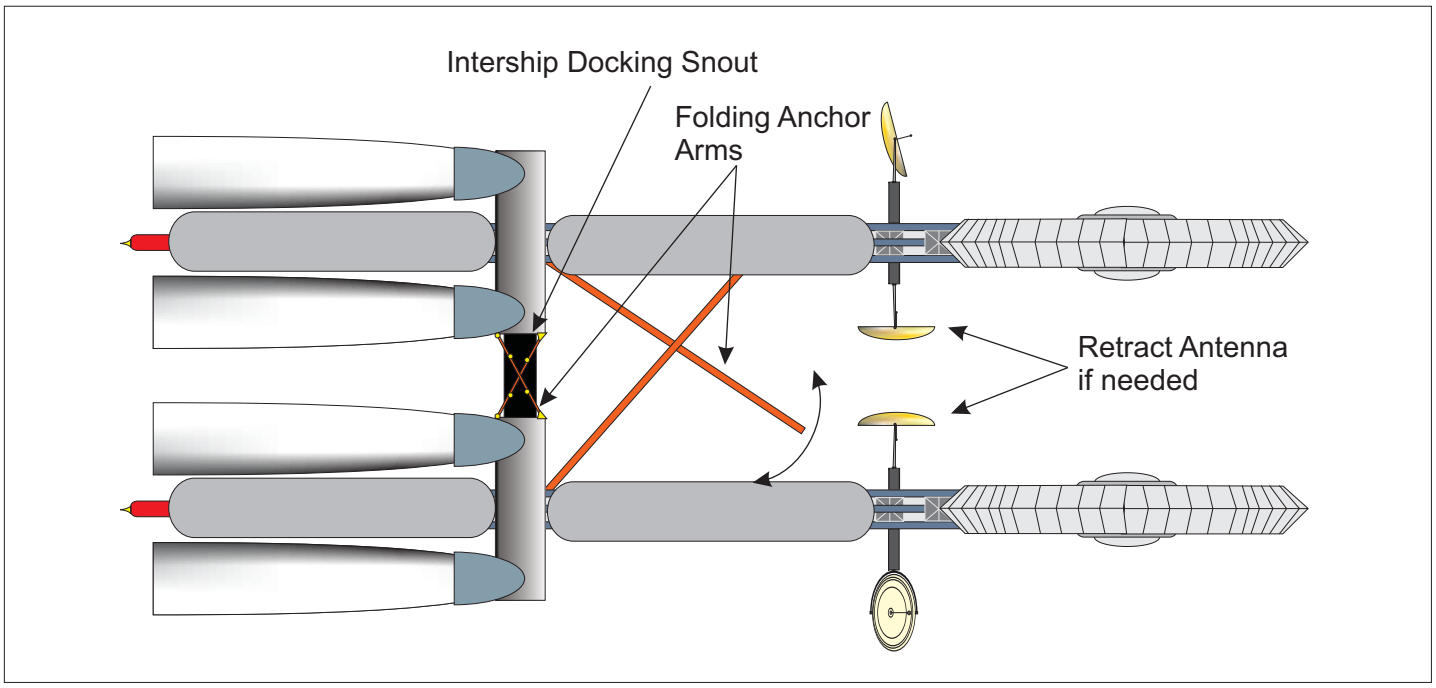
If Springships need to dock together, for support, communication, transfer of goods, supplies, people, small furry aliens from Alpha Centuri. etc., they will have the appropriate features to handle the loads likely to bear on them during such manoeuvre.

The Primary dock acts as the key point of contact for any such docking. A telescopic docking snout, standard 10' ring, will provide transfer access and a physical anchor point, using an array of standard folding anchor braces to lock and hold the snout in place and dampen any physical stresses and loads on the snout and ship's structures during docking.

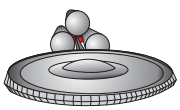
To help brace the main body of the ship longer anchor arms can fold out from the central spine and lock two spines together further along the ship.

If needed the appropriate antenna masts, top and bottom can be individually retracted for clearance to avoid damage in any mis-manoeuvre during docking or departure, although most such manoeuvres will be automatic ones controlled by robots.

As the general science and technology of Springships improves this style is likely to be superceded by alternative, stronger, simpler and more streamlined methods.



The entire assembly has a fail-safe break-away structure, to snap free if load becomes too great. This will prevent damage to the ships, crews, etc.



SPRINGSHIPS

Suggested design possibilities for long range interplanetary mission spaceships.

by Michael Bond

Appendix - 2C
yr2011

Launch Ships

Most ot this has been about the SpringShip, but we mustn't forget the need to reach a planet safely and many other duties needing another vessel.

This is NOT A SHUTTLE, and such terminology is STRICTLY FORBIDDEN.

A Launch, from the maritime tradition, is a ship in its own right, serving as fully-functional auxiliary vessel, transfer vessel, landing ship and ship to launch people and supplies into space and safe rendezvous with a SpringShip, station or other destination.

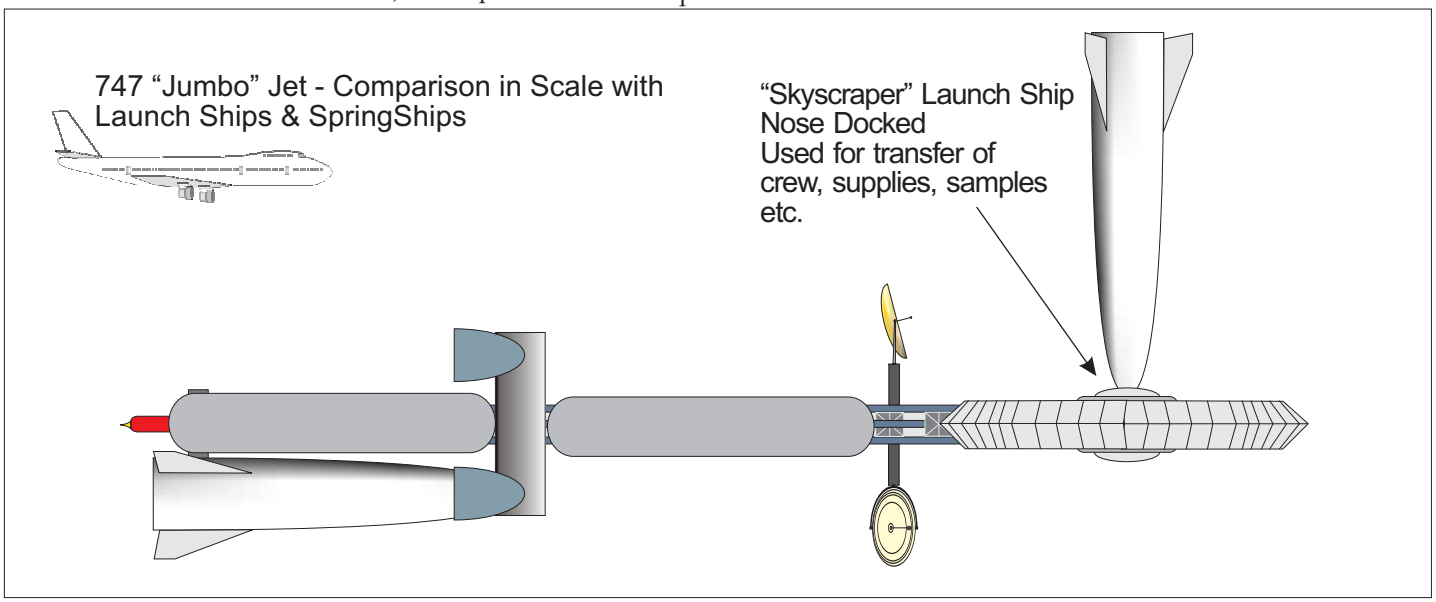
The Launch is also a lifeboat, full-capable of taking the entire crew of a SpringShip home safely.

There are two Launches on a SpringShip in this design configuration. Future technological advances may allow more Launches to be mounted when needed. In the role of lifeboat this means there is double the needed capacity to rescue the crew safely. We should all learn from the lesson of the sinking of the RMS Titanic and its lack of lifeboats and provide at least 100% surplus capacity for emergencies.

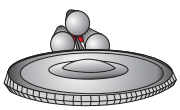
The Launch is a single-stage-to-space ship and needs to be designed with self-sufficient propulsion, fuel reserves and emergency storage and accommodation for all likely uses.

Don't save money on something that could save lives.

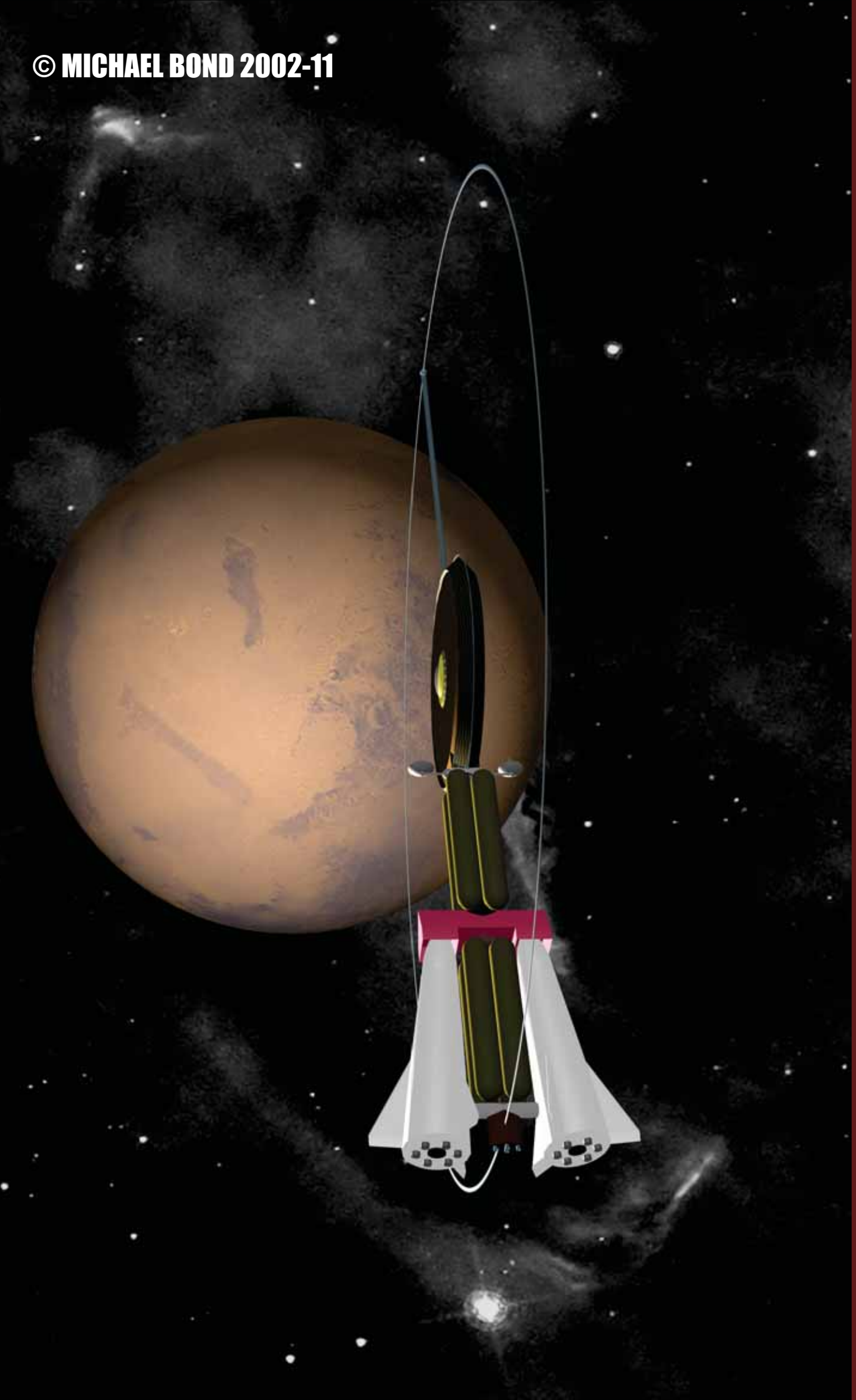
As you see from the comparison scales a Launch ship is at least as big as an original Jumbo jet, although this is mostly fuel tank, and the hull is built of lightweight, extremely strong composite materials.



Overall I expect the final design to be approximately three hundred to three hundred and fifty foot long, for the first generation ships.



Springship



SPRINGSHIP TO MARS - WWW.WORLDMAKER.ORG