



[A publication of the Milwaukee Lunar Reclamation Society,
a chapter of the National Space Society and of the Moon Society]

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How we can provide artificial gravity en route to Mars

We do not intend to go into design options in this article. To help you visualize the options, consider the artificial G rotating circular running track in the classic film 2001: a Space Odyssey. There are a number of other films where set designers have gone where no NASA designer has dared to go.

Rotating cylinders are the common answer. They do create a problem as their rotation would induce a counter rotation in the rest of the vehicle. A pair of mutually counter-rotating sections is the solution. *A simple flywheel turning in the opposite direction would be a much simpler solution. [A flywheel made of a material rare on Mars but badly needed there would kill two birds with one stone.]*

Most of the illustrations show *a very short radius which might induce coriolis problems. The simple trick of colored directional cues*, with experience, would keep crew members from turning too fast in certain directions. [Directional color cues for

[“ahead,” “rightwards,” “right,” “rearwards,” “rear,” “leftwards,” “left,” “aheadwards”] with ahead meaning in the direction the ship is headed, and “rear” meaning the direction from which the ship has been traveling - these color clues might, with practice, help travelers to put the correct “English” in a his/her motions]

Another suggested solution, is to **divide the ship into two sections, A. Crew & Passenger Quarters & Facilities & B. everything else (especially high density items and heavy equipment rarely needing service, such as Container Factories), pay them out and apart on a tether (better, on a collapsible twist-resistant beam or truss,) then induce rotation about a common center of gravity.**

Now there is another ideally perfect option: thrust at 1 G halfway to Mars, flip the ship and decelerate at 3/8th G until you arrive. Unfortunately, we know of no engineerable way to do this, or of no propellants with this much oomph for the same mass.

Nuclear ships powered by lunar thorium derived hydrogen 333 just might allow such a solution. Once at Mars, these thorium reactors will remain there where they will be much needed for electric power generation.

Going to Mars to Stay

From Mars Mission One on - everyone goes to stay, to live out the rest of their lives on Mars, and to breed following “native born” generations.

This is the only way to grow rapidly, up to a population large enough to tackle whatever problems and hitches come their way.

Earth to Mars spaceships should be making a one-way trip as well

On landing on Mars, and disbursing settlers and cargos, ships should be disassembled, all their parts getting new “on-Mars reassignments” of one sort or another *for which “re-applications” they were pre-designed.* This speeds up the growth of settlements on Mars.

Such is a commitment essential to success. This applies to reporters as well. They must choose to stay on Mars and make it their home, before leaving Earth, and keep sending reports to Earth-side supporters and to the Earth public at large. This is why we propose that anyone and everyone interested in moving to Mars “to stay” should spend time on the double torus in Earth orbit described in a recent issue of Outbound, with quarters in the inner torus not only designed to be like what homes on the Moon would be like, but also simulating Lunar 1/8th Earth normal gravity; and with quarters in the outer torus not only designed to be like what homes on Mars would be like, but also simulating Mars’ 3/8th Earth normal gravity.

Why no tourists, no reporters on temporary assignment?

Simple! *There will be no ships returning to Earth. All ship parts will have been designed for reassignment use once on Mars. That is the most efficient way to grow from the first arrivals into a new world capable of handling its own problems.*

Going to Mars should be a commitment to spend the rest of one’s life there!

This applies to reporters from Earth newspapers, radio/Television stations, government staff, etc. That’s why our proposed dual space torus space hotel with Lunar and Martian sections is so important. A stay of a couple of months in one or each torus, with lunar and Martian gravity levels and other Moonlike and Marslike details, is so vital. *Time spent on each double torus level will purge most of those who don’t have the “right stuff.”*

What about medical emergencies? Doctors on hand will do the best they can, getting advice by radio/TV from staffs on Earth. Establishing good hospitals on Mars is a prime goal.

EXCEPTIONS?

Ships designed for repeat round trips, bringing reporters, and tourists, paid for things \checkmark made on Mars and \checkmark destined for the Moon \checkmark that cannot be produced on Earth \checkmark or that can be shipped to the Moon at less expense than similar items produced on Earth (when arrival time is not important) probably *on unmanned robot-controlled ships.*

“Visitor Round Trips” to Mars will be very expensive (settlers, committed to spending the rest of their lives on Mars, will not have to pay their one way ticket to Mars) - these expenses could be waived or returned for visitors who, after spending some time on Mars, decide to stay, and who have talents and expertise that will be needed on Mars.

Settlers who have changed their minds and want to return to Earth will need to finance their return trip on freight ships bound for the Moon, and once there, pay for the short trip from Moon to Earth.

Opening Mars, so much further from Earth than from the Moon, will be quite different than opening the Moon, in Earth's back yard.

Mars<>Moon Trade

But what about Mars<>Moon Trade? Robot Unmanned Ships would seem to be the best solution. Hitchhiking a way back from Mars to Earth via the Moon could take the better part of a year or more, as windows for Mars<>Earth/Moon are more than two years apart, not a solution for "emergency problems."

What does Mars Have that would be of use on the Moon?

The quick answer is nothing. But for some time, when it was the common belief that Mars' two mini-moons, Phobos and Deimos, were captured asteroids, possibly rich in carbon and nitrogen alloys, both scarce on the Moon, and that Phobos and Deimos were the cheapest source. The easiest way to ship these elements to the Moon would be as Methane and Ammonia.

However, it is the *current* belief that both these two mini moons are made of Martian material, blown into orbit by an impacting asteroid, and that neither moonlet is rich in carbon or nitrogen.

But the question remains. We do not know Mars well enough to say with confidence that this rusty planet has nothing of use to pioneers on the Moon. Indeed, Lunan settlers whose bodies have gotten used to the Moon's light gravity, may find it difficult to visit Earth without an "exoskeleton" to help their relatively weaker muscles to cope . It will be far easier, but still difficult, for Lunans to visit Mars with its "in between" gravity level, than to visit Earth.

But the reverse situation remains. *It will be far cheaper to ship to Mars anything made on the Moon than to ship equivalent items out of Earth's much deeper gravity well.*

And that is a prime reason to develop the Moon first.

However, Earth's immense manufacturing industries will have to ship those products to Mars that are not (yet, or may never be) made on the Moon.

Basalt-based Industries on Both Moon and Mars

When it comes to expertise in making a wide range of products out of basalt, Lunar experts will be welcome on Mars. Some special vehicles made on the Moon, might also be of use on Mars. Indeed, in many frontier areas, Lunar experience may be of use to Martian pioneers.

The cabins on space ships headed to Mars, may well have been made on the Moon out of cast basalt (and their furnishings too), again making one way flights from Earth to Mars less expensive, via rendezvous with a ship coming from the Moon, and furnished there.

On arrival on Mars, these cabins will be placed in the settlement and become settler homes there. Indeed such spaceships will have the bulk of their passenger section assembled with Moon-built items, designed to serve new functions in Mars settlements. Ships whose bulk components were manufactured on Earth and thus shipped into space at much higher costs out of Earth's much deeper "gravity well," will be prohibitive in comparison.

These considerations make it clear that the Moon should be settled first, and that then it will be much less expensive for pioneers to make the journey to Mars directly from Earth.

This is not a case of "rivalry" but of "**thoughtful collaboration.**" #



A Gravity Jug Set: (much easier to make than the “gravity bricks”)
Mars jug 3/8ths filled with water, the rest filled with foam pebbles to distribute weight evenly.
Moon jug 1/6th filled with water, the rest filled with foam pebbles to distribute the weight evenly.
Earth Jug 100% filled with water only

The Gravity Bricks and/or Gravity Jugs sets are a hit with kids and adults alike, as they really get across one of the key differences between Earth, the Moon, and Mars.

Want to take your kids (and yourself too) to a “Moon-like” place here on Earth?
Head to “Craters of the Moon” National Monument in South Central Idaho,
about the same distance from either Boise, Idaho or Salt Lake City, Utah airports.



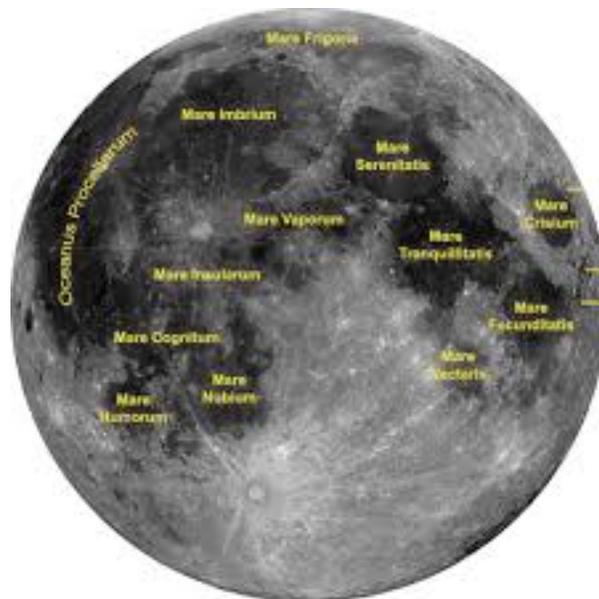


A typical view of basaltic lava fields in Craters of the Moon National Monument.

This extensive **lava field** formed thousands of years ago during eight major eruptive periods along the **Great Rift volcanic zone**. Lava here covers approximately 618 sq mi (1,600 sq km). Earth's crust is being pulled apart in this region due to "**basin and range** type faulting."

On average, **lava eruptions** occur in this area about every 2,000 years or so.

This terrain is like the Moon's "maria" (pronounced MAH ria) frozen lava "seas," the dark areas we see on the Moon in the image below.



“Living Walls” aka “Green Walls”

“Google” either or both of the above to see the great variety of plants, and arrangements.



Above: a **Living Wall** section used as both a room divider and air refreshener
Below: **Living Walls** can line one side of a “Middoors” passageway with doors to Homes on the other side. An infinite selection of leaf only plants, flowering plants, fruit plants.



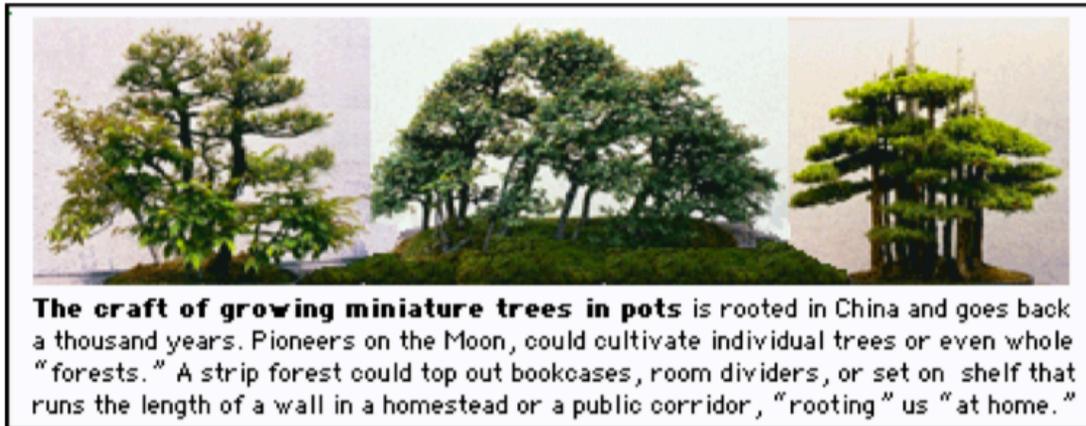
It is hard to imagine any other feature that will make settlers feel more at home!

More, the water drainage system at the bottom could host tasty **tilapia** fish.

Add a careful selection of **birds and butterflies**, and who wouldn't feel “at home?”

And there are similar “**Vegetable & Fruit Wall**” designs. Google that too!

More, we can even grow **miniature “bonsai” trees** inside settler homes, on top of bookcases, or on a shelf below windows to the sterile lifeless “outdoors.”



The secret to *making ourselves at home on the Moon or on Mars*, is to find ways to bring some of the best features of Earth, inside our homes and settlement passageways, Including a thoughtful selection of animals as well, those most likely to adapt quickly to the “middoors” in place of the lifeless “outdoors,” without becoming parasites.

The “attitude” that is, and will keep on “driving” Space Exploration & Settlement:

Tell us *why we can’t do this or that in space,*
Or on this or that planet or moon,
and we will be charged up enough
to find a way or ways that we are going to do it anyway.

Tell us (kokhmmm@aol.com) what role you would like to play
(if you had the opportunity)
 in opening worlds other than our Earth
 (let us know if you do not want your name mentioned.)
Your “dream” may inspire others,
and just maybe the one who will make your vision come true!

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Milwaukee Chapter News

√ We have notified **Claire McMurray** who takes care of our Meetup page information, about our new Meeting Site, in the Wauwatosa Library, on North 76th Street , just south of North Avenue

The North Avenue entrance is closed on weekends. **There is a driveway parallel to North Avenue to the south, with a sidewalk to the entrance.**

Once inside, tell someone at the desk that you are here for the meeting of the Milwaukee Lunar Reclamation Society and you will be given directions. Our meeting room last month was small, room for ten and there were nine of us, so we are hoping for a larger room next time. We showed a movie about one of the first astronauts. ##

The Wauwatosa Library does not charge us a fee.

The reason we stopped meeting at Mayfair Mall is that they wanted to start charging us \$40 an hour, and as we usually stay longer, we were looking at \$80 or \$120 fees monthly. Previously, we used the room for free for many years.

City busses #67 run on North 76th Street and **#21** on West North Avenue.

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A Space Expo for Milwaukee?

We are currently considering the idea of a **Space Expo** of sorts to which we would bring **all of our chapter display items**, and **piles of back issues of the National Space Society's *Ad Astra* magazine.**

Date and Location to be decided.

There would be no entry fees for chapter members.

We hope to √ find new members and √ to enthuse young people about space.

Our target audience will be Middle School students (most older students being interested in dating only, as we learned in previous High School science fairs.)

We have never done anything this ambitious before and will be taking a gamble that we might pick up new members this way.

New member Ron Schaefer is heading this effort.

You can contact Ron at solarwindmedia@gmail.com

The more people attend, the better chance we have of picking up new members, as the ability to host more ambitious public events.

Our sister Mars Society chapter, [Milwaukee Mars Reclamation Society "Outpost"] is down to one member, moi!

Back in 2005, we were very involved, and put together a Moon Society/Artemis Society crew at the Mars Desert Research Station in southern Utah.

Looking further back, our chapter hosted the 1998 International Space Development Conference here In Milwaukee, and it was at this event that we gave Robert Zubrin the opportunity to announce the formation of the Mars Society.

So if you know anyone *more, or also* interested in Mars than in the Moon, our chapter meetings are still the only place to go in Milwaukee. ***We're interested in the future settlement of both worlds!***

Below, *Earth, Mars, and the Moon size comparisons.*

In comparison to its planet, our (the) Moon, is by far the largest “moon”.



Note: Pluto's moon Chandra, is bigger, half the diameter of Pluto. But it is more correct to say that they are twin worlds, a “binary planet” so to speak. Why? Both Pluto and Charon show the same face to the other, locked in that position, reason enough!

Having “our” (“the”) “Moon,” is a singular advantage!

It has already made Earth more livable,

by slowing Earth's rotation, through very high tidal waves in our ocean,
thereby lengthening our day,

from perhaps only 8 hours to our present 24,

while pushing the Moon further out in the process.

Without our Moon, Earth would be a very different world.

And quite probably, we humans wouldn't be here on it.

And then Mars would never be inhabited someday either.

Note: it is possible that there are many “Earthlike” worlds out there,
but without oversized moons like ours, they may have had far less chance
of becoming inhabited by sentient beings such as ourselves.
Considering all this, the Moon is the most important body in our solar system
besides the Earth (which wouldn't be the same without it.) ##

