

Space Travel

Carl Warren Andreasen – Revised 5/9/24

It sounds silly to talk about how to tell time in space, but when you stop and take a close look at it, it is a real problem.

Time as we know it is totally based on the Earth. One orbit around the Sun is called a year. One rotation of the Earth is called a day. There are 365 days in a year (not quite exactly which is why we have February with 28 or 29 days to make up the difference). Each month is based on the phase of the moon cycle (12 per yr) and each week is seven days, and each day is 24 hours (not quite exactly which is why Universal Coordinated Time (UTC) has leap seconds to make up the difference. Divide each hour into 60 minutes and each minute into 60 seconds.

We know all of this and take it for granted. The Earth itself is our clock. All time as we know it is based on the Earth. The fact is that our time system can only exist on Earth... and therein lies the problem. Even our astronauts in orbit are faced with the problem. Day and night have no meaning. The only solution is to pick a place, like Mission Control, and use their time, and that is what is done. On the International Space Station the Americans use Houston time (I think) while the Russians use the time of some point in Russia. There is no day or night, just sleep periods and awake periods that are assigned by mission control.

Let us take the next step and take a spaceship out into the cosmos. There is no visible Earth, no day or night, nothing we can base our 'ship time' on except maybe a 24 hour clock from Earth (and hope it never fails.). When we get to another planet, we could try to adapt, but Earth time will not work. The length of the day, month, year would be incompatible with Earth time. Earth time only works on Earth. For example on Mars a day is slightly longer than an Earth day, One year would be about twice as long as an Earth year. An Earth calendar would not work, an Earth clock would be useless. Earth time would be irrelevant. A Mars colony would have to invent a whole new way to mark time. We must also remember our biological clocks, how will they adapt to a new time system?

On top of the time problem, think of the weight problem. There is no such thing as weight as such, only the pull of gravity. In open space there is no gravity, no weight, but using centrifugal force we can simulate gravity and things will 'weigh' whatever we set it to be, but every body in space, planet, moon, anything will have a different pull. We won't have weight, we will have mass that will react differently for every location. Weight is meaningless once we leave Earth. In space a brick of lead, and a feather will 'weigh' the same (nothing) and float in the air. If a ship had a big ring that was spinning to simulate gravity, people would find that 'weight' is only in the ring. As one moves closer to the axis the effect lessens until at the hub the person would be slowly spinning, but weightless.

The space traveler will have to adapt to a whole new way of thinking. For starters there must be a new way to observe time, there needs to be a celestial standard however I have no idea on what it would be based. Birthdays could become complicated, or lose their meaning. One can use Earth hours and minutes based on a clock brought from Earth, and that will work until the traveler reaches a destination.

On Earth we have a magnetic shield around the planet. Space is full of radiation that can kill us. Think of your worst Sunburn. That was caused by Solar radiation after being being dampened through the

atmosphere, and in space it would be much worse. Some radiation is easy to deal with, just block it (pull the shade, stay indoors) but other dangerous radiation is not. Consider X-Rays, Gamma, a long list of 'rays' that are very difficult or impossible to block.

Once we leave our magnetosphere we become subject to this radiation and I have heard it said that with present technology astronauts would be unlikely to survive a trip to Mars. We can send robots on one-way trips to Mars, but not people. Keep in mind that no feasible spaceship could carry enough fuel for a round-trip. At the closest approach to Mars, it is still an 8 month trip one way. Coming back home is not really much of an option. You would have to wait for another closest approach and they only happen every couple of Earth years.

One of the first factories on Mars would have to manufacture fuel and it is not clear how to do this. Keep in mind that there is 'probably' water that could be mined and separated into Oxygen and Hydrogen using electric power from Solar panels or maybe a nuclear reactor (Where to get more nuclear fuel?) but so far, that is about it. Making enough liquid Hydrogen and Liquid Oxygen to fuel a spaceship back from Mars to Earth would be a slow process, and to generate enough fuel could take a very long time. Don't forget a lot of the recovered oxygen would have to be used internally for breathing and water for local consumption and growing of crops. Note that the dirt on Mars is sterile so without organic fertilizer, nothing can grow in it. On Mars a 'village' would have to have a full ecosystem to handle everything, including waste. Everything would have to be recycled, over and over in a completely closed cycle. I suspect that if a person died, the body would also have to be recycled

Let's face it, unless "Warp" travel becomes more than science fiction, we are stuck here on our Earth, anything else is not feasible with technology as we know it. At the minimum we would need a new kind of rocket engine that does not rely on chemical combustion energy. And we need much higher speeds. We need artificial gravity.

I am left with the understanding that God created the Earth for mankind and that is where we belong. I seriously doubt man will ever be able to go and stay anywhere else and survive. We are part of this Earth and closely tied to it. Science fiction is fun but it is just fiction. Mankind is closely tied to Earth and there is no place we can go that is better, or even survivable in the long term. Going to Mars would be like going to a maximum security prison at the South Pole, with no communication with the outside world, and 8 months of isolation before even arriving, and having to survive on food you grow yourself otherwise you starve to death. You would spend the rest of your life there. That would grow old really fast! Another reason it would be difficult to return to earth is gravity. Eight months trying to maintain muscle tone while in space, then a third Earth gravity while on Mars, then the return trip, the body would no longer be able to handle Earth gravity. A person who weighs 180 pounds on Earth would weigh only 60 pounds on Mars. Think of tripling your present weight and how you would function.

Here is a thought; to test our ability to survive, set up a 'Mars Village' near to Earth's South Pole and try to make it self-sufficient without any outside intervention. Even with no air problems and a lot of ice and snow to melt for water, and communications with the outside world, and emergency help (medical or food) by supply aircraft. If that cannot be made to work, there would be no hope of surviving on Mars.