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RETURN TO THE MOON

Ken Tapping, 26th August, 2014

In 1969 we landed on the Moon. There were a few more expeditions, but it all stopped in the 1970's. Now there is a lot of discussion about going back to the Moon. We have learned a lot about our nearest alien world, but there is still a lot we don't know, and many things we could do there. Firstly, it would be good to have our first long-term base on another world near home, so if anything goes wrong, help is not months or years away. We can develop the technologies and identify the problems in our planetary backyard. We can learn about mining and extraction of our needs (mainly water and oxygen) from local resources. The Moon offers lots of solar energy, and no cloudy days.

We could build large telescopes on the Moon. There are no clouds or atmosphere to worry about, and the telescope would be sitting on solid ground. Since the Moon has only about a sixth of the gravitation attraction we live with here on Earth, the telescope components would weigh less, and larger mirrors become feasible. Radio telescopes on the far side of the Moon would not have to live with the cacophony of manmade interference we have concocted for ourselves here on Earth.

A future trip to the Moon could be something like this. Our first step would be to get into orbit. There we can check everything out to see how it survived the savage vibration and accelerations during launch. If anything serious is wrong, firing retrorockets would put us on a trajectory back into the Earth's atmosphere and on our way home. We could rendezvous with the International Space Station and possibly assemble the mission there, using multiple launches from Earth.

Then we fire thrusters and push gently away from the space station, and then fire the main engines to put ourselves into an elliptical orbit extending from where we are in Earth orbit out to the neighbourhood of the Moon, 384,000 km away. We then slowly drift along this path, towards the orbit of the Moon. On our way we would cross the inner and outer radiation belts, but we won't be in

them long. Quite a few astronauts have been through them with no ill effects. Our departure from the space station would have been timed so that as we reach the farthest point of our orbit, the Moon is there too. As we get closer to the Moon its gravitational pull gets stronger, helping us along. Then we fire our engines again, and we are orbiting the Moon. We do more equipment checks, confirm our final landing location and, at the right time, fire our engines again, slowing the spacecraft so its trajectory curves down towards the Moon's surface. There is no atmosphere we can use for slowing us down, so we need to use our engines.

Science fiction books often have lunar bases sitting under huge inflated bubbles full of air. We can certainly deal with the lack of an atmosphere and the huge daily temperature changes that way. However, for long-term residence we need to consider the radiation hazards. Here on Earth we are protected by the Earth's magnetic field and atmosphere. The Moon has neither of those. A solution is for us to build our lunar bases underground. This will shield us from radiation and also moderate the huge temperature changes that occur on the Moon's surface during the day.

To get home we blast off from the Moon's surface into an orbit around the Earth at the distance of the Moon. Then we fire our engines to put ourselves at the outer end of an elliptical orbit with its low point close to the Earth. Then, at the Earth we slow ourselves down with an engine firing and rendezvous with the space station, or use the atmosphere to slow down to where we can glide to a soft landing on the Earth's surface.

Jupiter and Venus, the two brightest planets lie close together low in the predawn glow. Venus is the brightest one. Saturn and Mars lie close together in the sunset twilight. Mars is furthest west. The Moon will reach First Quarter on the 2nd.

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