Space Journal

Volume 1 | Number 1 Article 7

7-1-1957

Some Future Astronomical Considerations

Herman Oberth

some future astronautical considerations

By Hermann Oberth

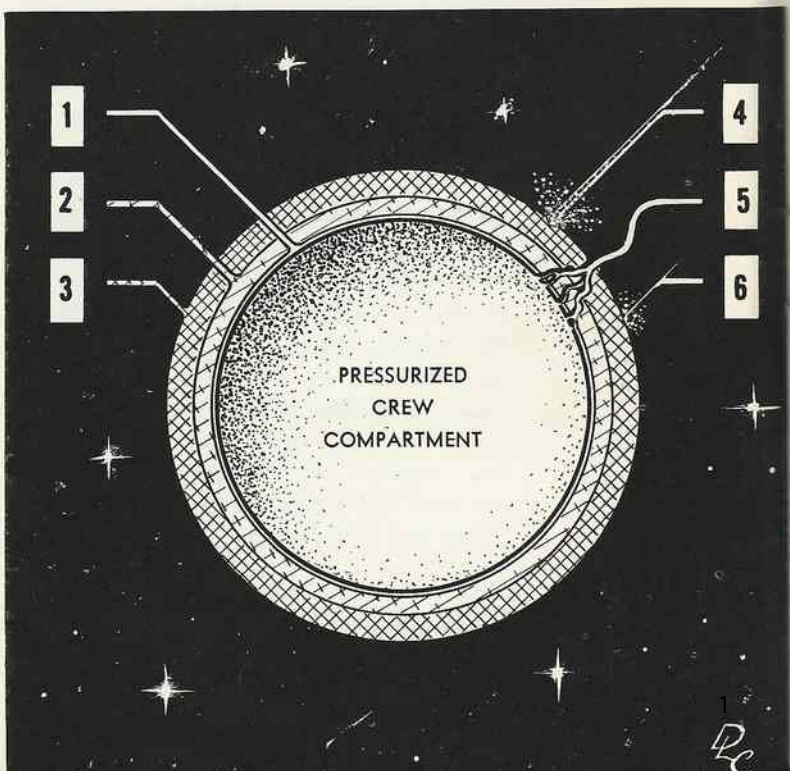
THE FIRST MAN-MADE earth satellite will soon circle the earth. This satellite, and succeeding ones, will be small (not much larger than a basketball), and will carry nothing more than a few instruments. Larger satellites, equipped with elaborate automatic instrumentation, will follow, and by means of ultra-high-frequency radio, will transmit information to the earth.

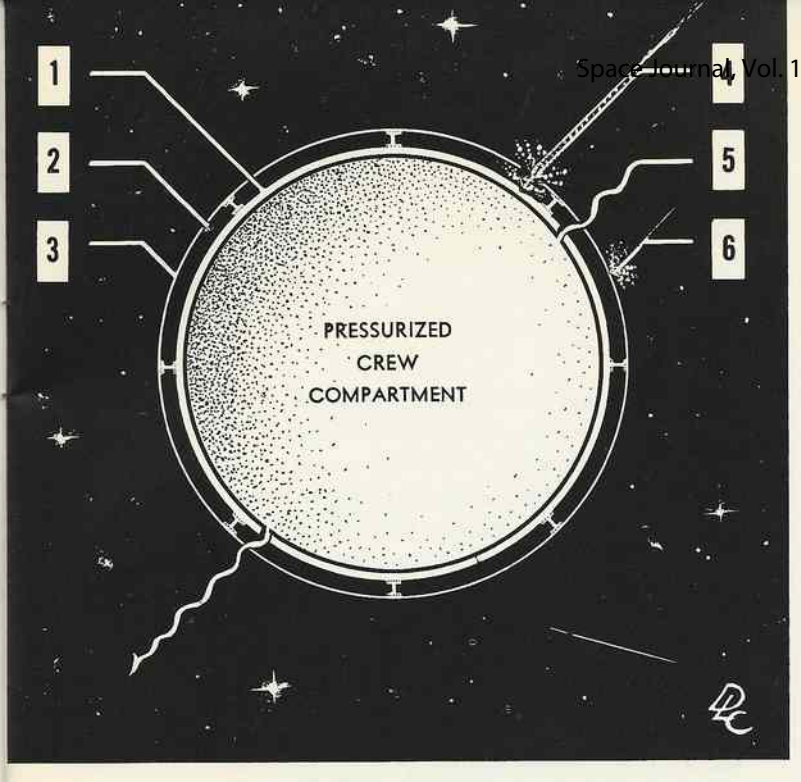
Even now, experiments are being conducted at Randolph Air Force Base, Texas to ascertain what the human body can withstand. From these experiments, engineers will determine those points in the construction of ferry rockets and manned satellites which will require special attention. This work will be completed in five to ten years.

The next step forward will depend on information concerning cosmic rays and cosmic dust which we shall have gained from unmanned satellites. Space technique can then follow either of two courses. I should like to call these "the course of the thick walls," and "the course of the thin walls." Space travel will be possible in either case.

THICK WALL TECHNIQUE

1. BERYLLIUM — ½ INCH
2. ALUMINUM — 9 INCHES
3. LEAD — 12 INCHES
4. SMALL METEORS
5. COSMIC RAYS
6. COSMIC DUST





THIN WALL TECHNIQUE

1. SPACE SHIP WALL
2. EMPTY SPACE
3. OUTER SHELL
4. SMALL METEORS
5. COSMIC RAYS
6. COSMIC DUST

On earth there are people who live 9,000 feet (and, of course, even higher) above sea level. If we consider the 9,000-foot altitude as an example, the protection afforded these people from cosmic rays and dust by the atmosphere above them would be duplicated in a space vehicle by a layer of liquid air seven meters thick. Naturally, it will not be necessary to use liquid air as a protective layer, since the same effect can be obtained with a one-foot-thick outer shell of lead over a nine-inch-thick shell of aluminum. A third, or innermost, shell consisting of one-half inch beryllium will complete the effect. Observation ports will also consist of three layers. Beginning with the outermost, or exterior, layer, there will be foot-thick flint glass, then a nine-inch layer of crown glass, and finally, one-half inch of plexiglass. The space traveler could spend all of his life in such a protected area, without danger from cosmic rays and dust. This is the course which I call "the course of thick walls," a course which, I hope, will not be necessary, since the human body may very well be able to withstand cosmic rays.

If the human body is able to withstand these rays, the space vehicle's walls can be made of very thin and light material, so that few "secondary" rays would be encountered. For protection against cosmic dust, the vehicle walls may be constructed along the lines suggested by Dr. von Braun (a protective shell placed around the whole at a distance of one or two inches). When cosmic particles strike this outer shell their high speed will cause most of them to heat and evaporate. The diminished force of the remaining particles will not be sufficient to damage the inner or actual vehicle wall. This will be the technique of "the thin walls."

Thus, astronautical technique will take one of the two following courses:

1) In the case of the thin walls, construction materials will be obtained right from the earth, and large orbital space stations will be built. Perhaps large mirrors of metal foil will be used to influence the earth's climate. Soon electrical space ships, such as those suggested by me in 1928 and further developed by Dr. Ernst Stuhlinger, will be built. These will not be launchable from the earth, but will be capable of leaving an orbital station with ease. They will use little fuel, and with them we shall easily be able to rise to 22,000 miles. A station orbiting at this altitude will complete its path once each day, and could be controlled to remain over the same spot on the earth continually.

Large telescopes could keep an accurate "eye" on the earth in order to ascertain, for instance, that countries are actually keeping their disarmament promises; or, photographs could be obtained to counter Russian propaganda concerning so-called benefits to be derived from the Russian way of life. These stations could also serve television by acting as reflective relay stations for television waves. Likewise, communications will be improved, in that radio waves can be beamed and concentrated, thus allowing literally thousands of messages to be transmitted and received at the same time. In addition to this we can carry on many scientific experiments, and last, but certainly not least, we shall be able to reach other heavenly bodies with our electric space ships.

2) On the other hand, space technique will take an entirely different course should the human body prove incapable of withstanding cosmic rays for periods of little more than an hour. This should be the minimum time, since the human body can withstand X-rays which are ten times as strong as cosmic rays for a duration of a least 20 minutes. In this case, space vehicles with small, thick-walled cabins will be launched, and we shall try as quickly as possible to build an atomic powered electric space ship with which to obtain materials from the moon. We might even bring an asteroid into an orbital path around the earth, and get our materials from it. These materials would be used for the protective walls of any further space shelters for men.

The second course will not be as simple as the first course mentioned, but in any case, I think that by the year 2,000 we shall have developed space travel techniques.

"Common Sense is that layer of prejudices laid down in the mind prior to the age of 18."

—Albert Einstein