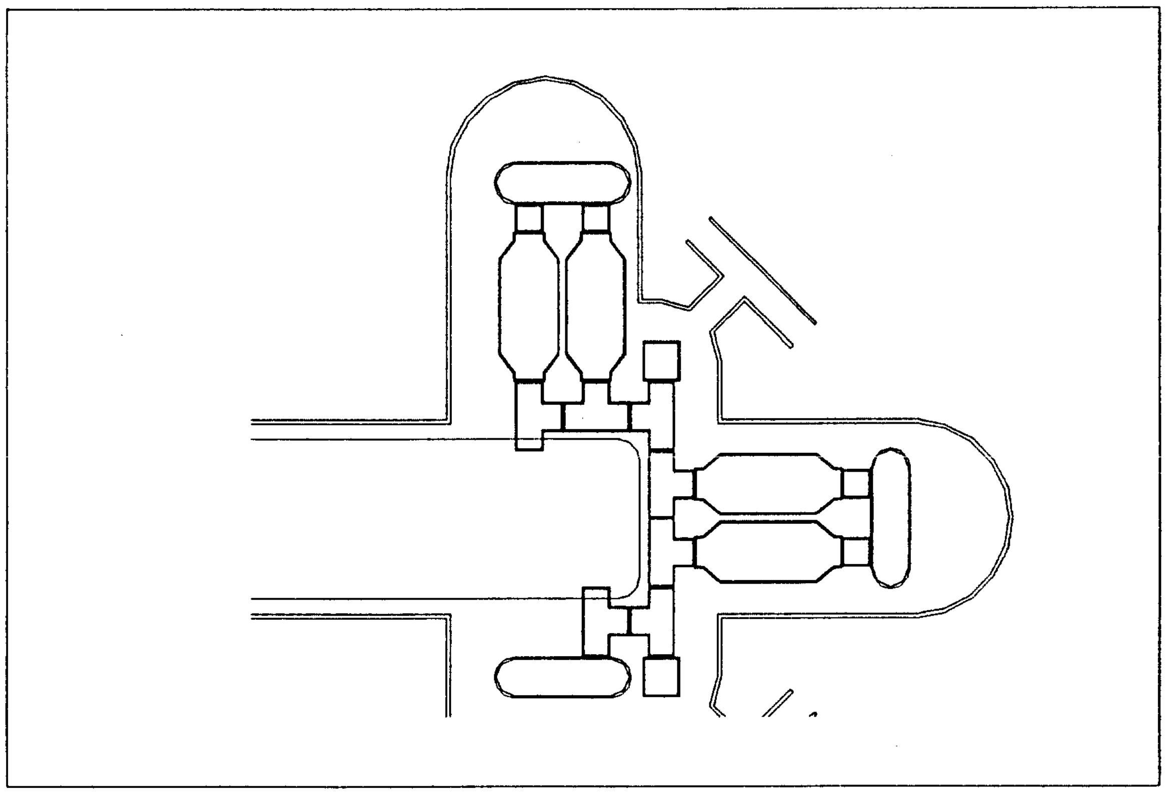
LUNAR TRANSFORMATION

Michael E. Bahr



An attempt to make as much use as possible of the lunar materials was the most important goal of this scenario. Limiting the amount of direct human involvement with the base construction was also an important issue in this solution. By utilizing robotics and abundant natural materials it is hoped that "cross-over" construction could occur within the first phase of the base's growth. A large economic savings would be realized by requiring only minimal earth payloads to reach a functioning level for the base. The use of robotic machinery would also greatly lessen the human risk factors.

As in many of the schemes, the radiation protection shield would function as its own entity. Derived from the lunar regolith and sintered (to weld with intense heat) into lunar glass blocks, the protective shield would be analogous to an igloo. As the blocks of molten regolith are created, the would be mechanically stacked to form the domed habitation areas.

The initial phases of development would rely on pressurized earth manufactured modules that would be inserted under the radiation protection shell. First phase development would include living/laboratory modules, airlocks, a power plant and a separate safe haven. The cylindrical first phase modules would include an articulated anchoring system to allow for various site conditions. They would also be easily removable for later expansion.

After a site has been prepared, robotic machinery would lay the regolith blocks, following steel frame guides in a cross pattern. Base equipment would then be inserted through one of the open ends. As more space is needed, long pneumatic structures would be inserted in other areas of the cross patterned shelter. The sintered block shelter would serve only as a radiation shield and because of its porus nature not a pressurized environment in itself.

Important qualities of this design scenario include the ability to create comparatively large pressurized spaces for uninhibited base growth. The mechanized construction sequence also lessens human risk and is very economical. Reaching a lunar resource cross over point early on would allow much quicker base growth.

Conceptual Analogy

When the Eskimos needed to shelter themselves from a harsh environment they built igloos with blocks formed from snow and ice found on the site. A small block, which is easy to handle, was used to build structures of a larger scale. All that was necessary to bring to the site was a small tool.
The lunar base can draw from the same technique.
A Robotic Construction Device can be sent to the moon before any humans. This RCD could form structures of regolith derived glass block.

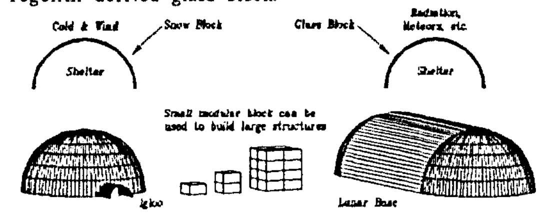


Plate 1 Michael Bahr

Growth - Phase 1

12 men on 1 month science missions using a minimum of modules.

2 housing/lab modules	3 'T' connection modules
2 straight connections	1 entry/airlock module
1 power/safe haven module.	

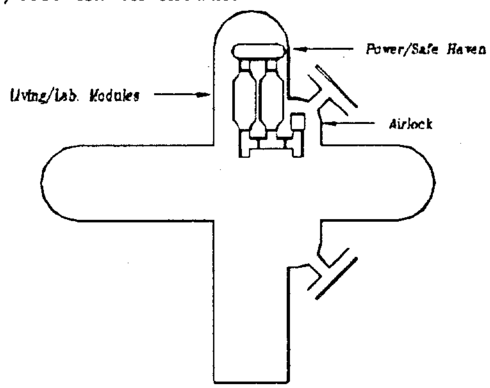


Plate XIV — Michael Bahr

Growth - Phase 2

24 men, 2 month science & experimental material processing missions. New modules:

2 housing/lab modules	3 'T' connection modules
2 straight connections	1 entry/airlock module
1 power/safe haven module.	

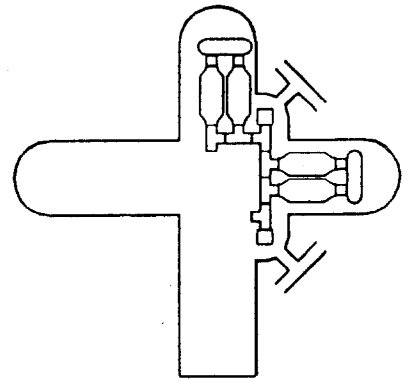


Plate XV — Michael Bahr

Growth - Phase 3

24 men, continuous duty science, mining, & material processing missions. New modules:

1 'T' connection module	1 power/safe haven
1 pneumatic module	

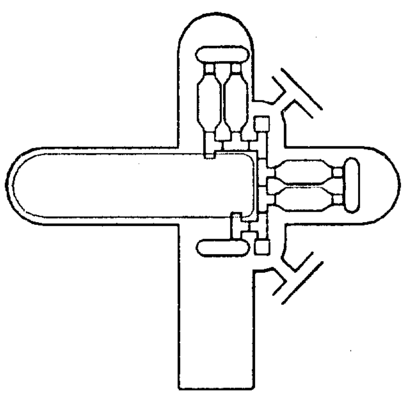


Plate XVI — Michael Bahr

Short Range Expansion - Phase 4

Short term expansion is provided by the allocation of space in the lower arm. The power/safe haven module located here can either supple systems to a small pneumatic structure or two more housing/lab modules.

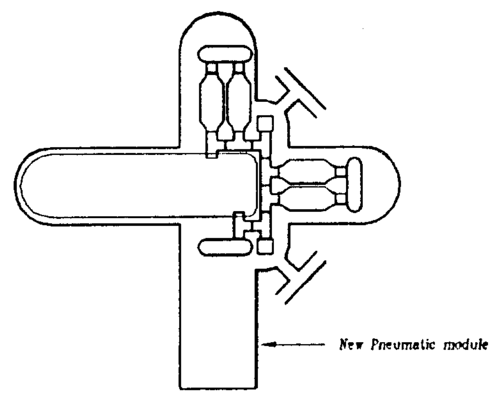


Plate XVIII — Michael Bahr

Construction

With the arches built, the rest of the structure may be completed. The terminating domes, entries, and inter-arch spaces may be built with glass block.
The path the robot follows as it lays the glass block course by course is linear and repetitive, reducing the chance for navigational errors.

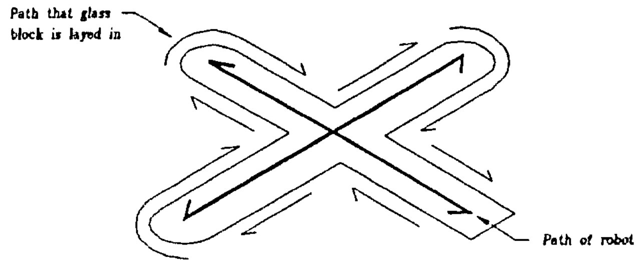


Plate XII — Michael Bahr

Block Formation

1 Collect Regolith
2 Melt & give form
3 Deliver
4 Fuse to neighbor

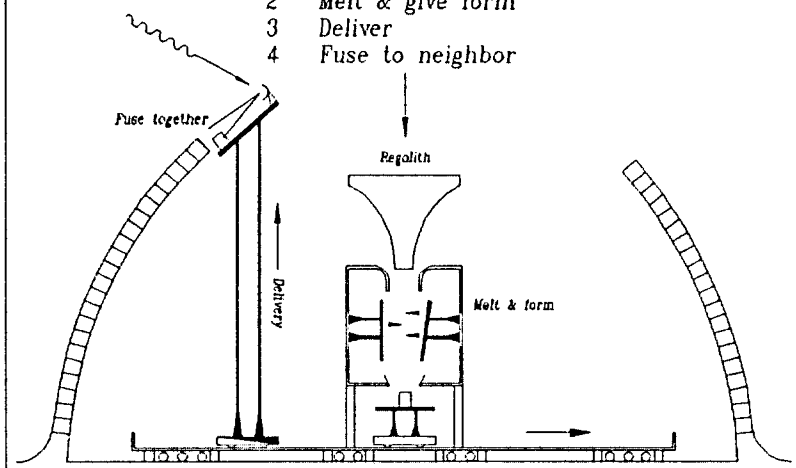


Plate II — Michael Bahr

Active Entry

A large triple-thick sliding glass block door is the moon bases active entry system. This door is used for moving the various modules and systems into and out of the base.

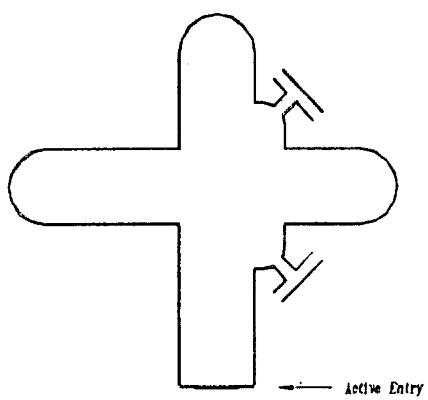


Plate XXIII — Michael Bahr

Passive Entry

The base uses two types of entry systems. The first is a passive system which uses simple techniques to reduce the amount of radiation entering the base. This type of entry is small scale and used mostly for entry by humans.

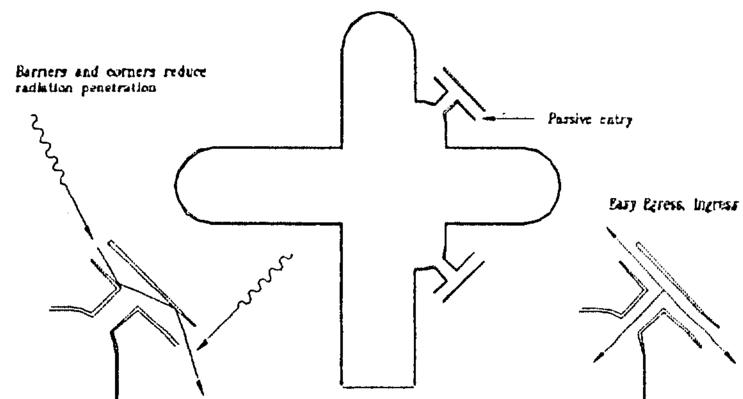
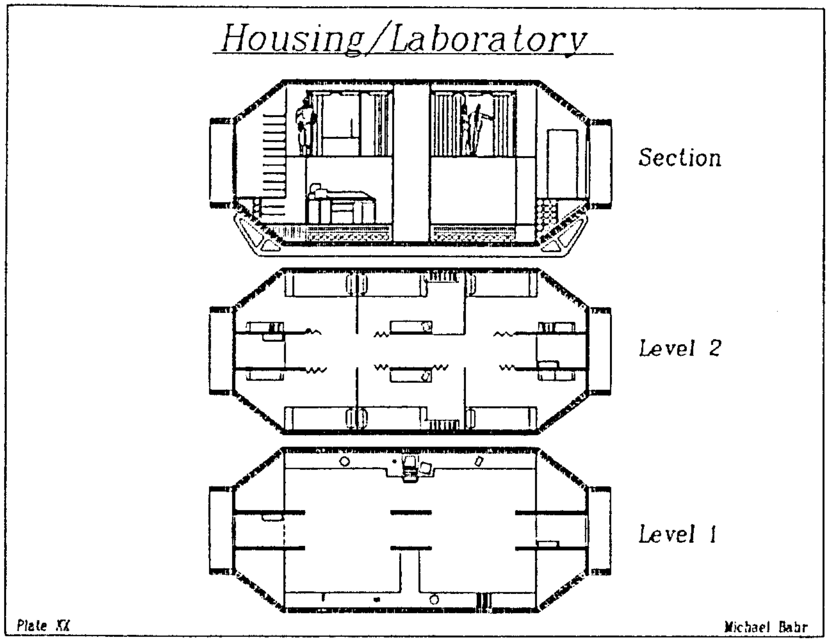
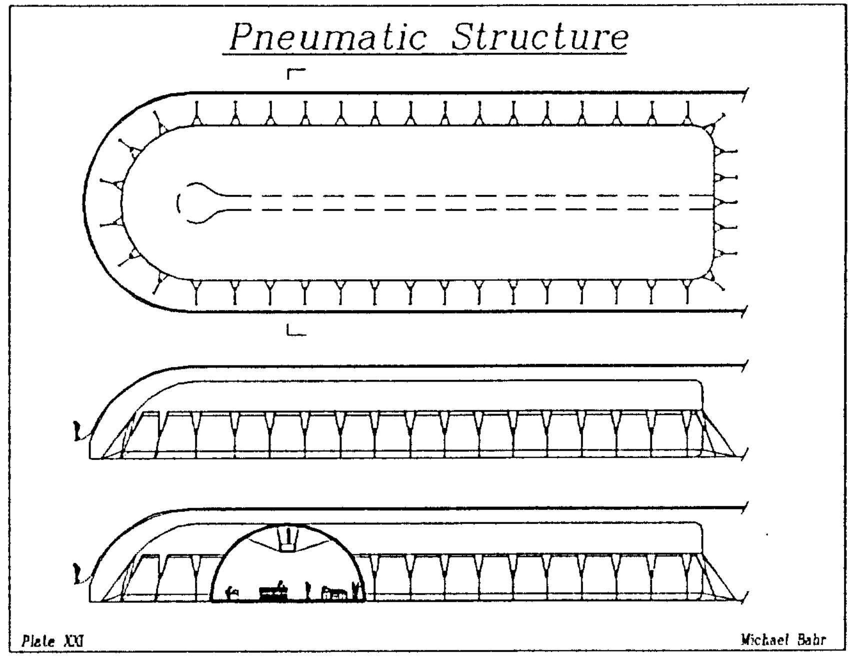


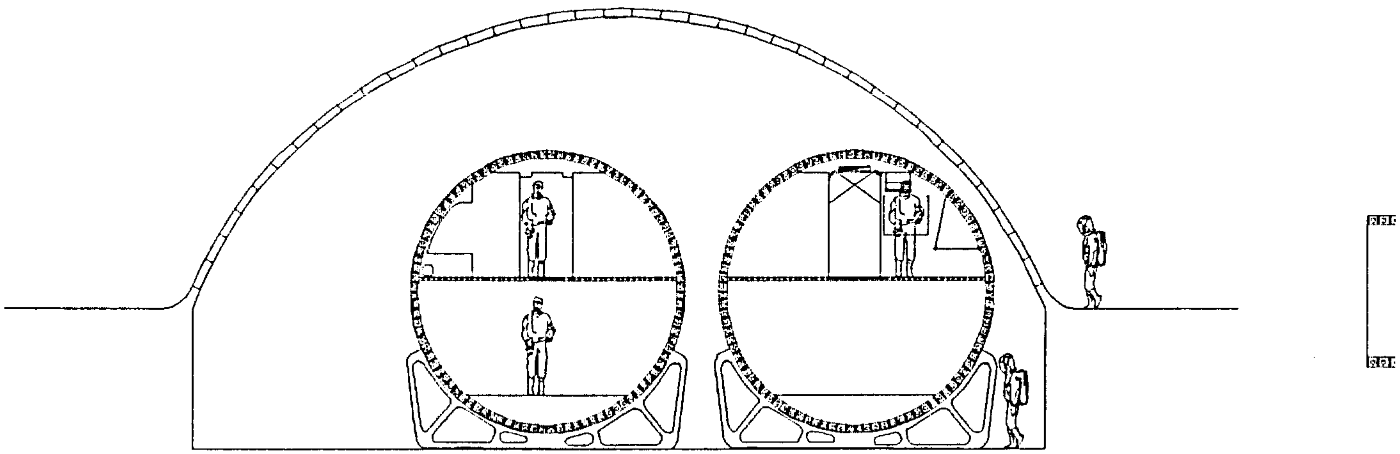
Plate XXI — Michael Bahr



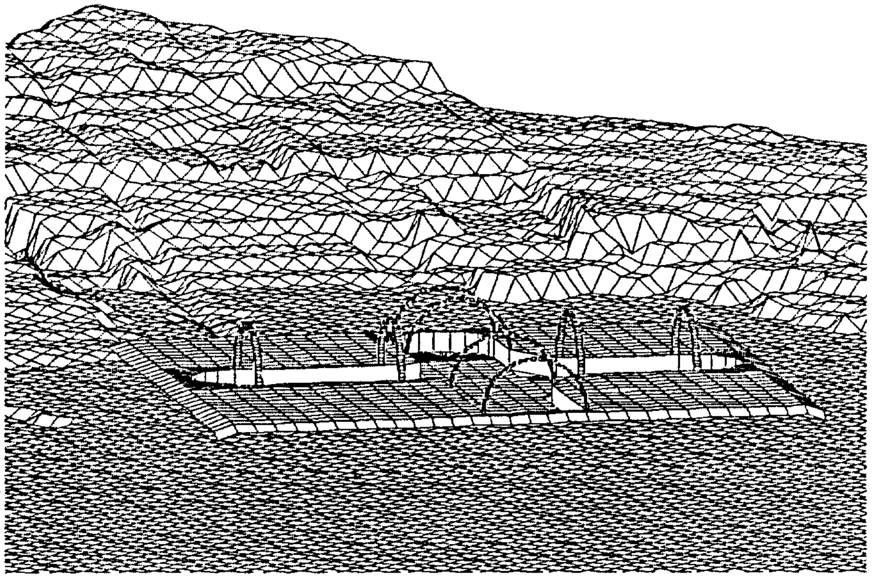
Habitation module plans and section



Cross-over technology inflatable structure.



Base section showing relationship between habitation modules and protective shell.



Isometric of base shell construction phase.

Isometric of completed shell