

ments of part I; do the preliminary experiments integration for spacecraft and subsystems conceptual design and resource analysis. Now out of this work thus far has come a concept, for example, of a space station which is built up on the LEM structure. For example, in this area we have what is called a Mirror figure test well. The word "figure" here means "shape." Here on the surface of the Earth we are constantly surrounded with a boiling atmosphere. It really doesn't pay to try to make astronomical mirrors to superprecision because you can't use superprecision anyway. We are diffraction limited, but when you put your space station above the Earth's atmosphere, it pays to be able to maintain a shape to within a fraction of a wavelength of light and therefore, we have illustrated a concept, for example, of establishing a mirror attached to an extremely rigid backing plate with perhaps 30 or 40 tubes—metallic tubes—each tube under varying hydraulic or pneumatic pressure so that you can move a part of the reflecting surface a part of a wavelength of light.

As this mirror is subjected to varying thermal fields from radiation from the Earth or from the Sun; as it is subjected to the presence or absence of the gravitational fields, or it's own structural deflections, these things can be compensated for.

Here we have laser telescopes with some outstanding characteristics. One of course is that they utilize high frequency energy; much higher than any radio frequency, and so they have the capability of transmitting enormous quantities of information. The other is that they are extremely collimated, that is, parallel. A 3-inch laser on the surface of the Earth puts about a 300-foot spot on the surface of the Moon. And so it's a communication means from Earth to Moon or Earth to Planet, if it can be aimed with sufficient precision, or from satellite to satellite. Certainly the laser is going to be exploited, along with its pointing mechanism, as one of the first things that is done in space technology. We have stellar-oriented telescopes.

Dr. VON BRAUN. I might also mention the military significance of this. With such a laser communication system you have an inherently safe communication link, because there is no problem of code cracking, it is a problem of simply not looking at you.

Mr. MELDRUM. Aiming.

Dr. VON BRAUN. Aiming at you, and you can get messages from the Pentagon to Vietnam that nobody in principle can intercept because nobody receives any energy except the military receivers stationed at the far end.

Mr. MELDRUM. Here is our summary—all of our Saturn vehicle launchings have been successful. All Chrysler Saturn work is on or ahead of schedule. The S-IB stage which we make is fully qualified, fully reliability tested, and is man rated. Our experienced Chrysler Saturn program costs, and our cost projections to program completion, are less than the targeted amounts. Activity has been authorized up to June 30, 1967, for the continuation of the program that will protect our program continuity of four IB stages per year when a follow-on program is authorized before the 30th of June. There is urgent need for immediate authorization of such a follow-on program. Without that authorization the major program will terminate in mid-1968.

Are there any questions? If not, we're about 8 minutes after 1, I think we're running 8 minutes late. We'll probably have to move on to the Boeing area. Thank you Congressman Teague.

Congressman TEAGUE. Thank you, sir.