

up the velocity that is required for reproducing the reentry conditions. Obviously, we have to provide more velocity during the reentry phase of the mission in order to simulate the effect of coming back from the 240,000 miles of the lunar distance.

The final Service Module burn provides an entry velocity of 36,000 feet per second which is the equivalent of the reentry velocity from the Moon. Recovery will take place in the Pacific Ocean near Hawaii.

Mr. FULTON. When we approach the Moon on the Apollo manned mission, we will be doing it for the first time. Why don't we have a mission that has a long elliptical orbit that includes both the Earth and the Moon as focal points and perform some of these operations in the vicinity of the Moon to see how these experiments work under real conditions rather than under simulated Earth conditions?

Dr. MUELLER. Mr. Fulton, we have examined that as one of the alternatives. The basic constraint we have is we have to operate the spacecraft unmanned and that requires the addition of supplementary equipment that takes the place of the men, which adds to the complexity of the equipment. In applying the mission as we have outlined it we have about an 8- to 9-hour mission. If we went the full distance to the Moon, we would be going to a mission that had a duration of several days, something like a minimum of 4 days, going that far and having to operate that far would require a different kind of a programming device. This can be self-timed so that it does not require, except in an override instance, commands from the ground. Basically it is a self-operating programmer. On a 4-day mission the discrepancies in time become such that you would have to depend upon ground command.

Mr. FULTON. Does the Russian booster have a big enough power booster to do that? Do we? For example, I felt possibly that the U.S.S.R. would have a manned mission in a long elliptical orbit that would circle the Moon and return to Earth. Can they do it? Can we?

Dr. MUELLER. We do not have that capability at the present time.

Mr. WAGGONER. Dr. Mueller, have you given any consideration to a manned flyby before the actual landing itself?

Dr. MUELLER. The way our missions are planned, once we have verified the equipment will operate satisfactorily for the lunar mission, we will establish a set of decision points that will allow us to go as far as the equipment and the procedures that we have developed will permit.

What that means is that the first step will be a commitment to actually take off from Earth, orbit and then go to the Moon. During the course of the mission we can in fact fly by it in the event that our service module propulsion engine malfunctions in some way. If we do fly by we will automatically fly around the Moon and come back to the Earth. If the service module is working we will use it to go into lunar orbit. At that point in time we can either stay in lunar orbit or we can commit to the lunar landing itself. That will depend upon whether or not the Lunar Module at that time is ready to carry out the landing phase itself. So we make a conscious decision in each step as to whether to proceed to the next step, it may very well be that the