Mr. FULTON. Because of distortion factors and heat, have you considered using a metal disk?

Dr. MUELLER. A metal disk?

Mr. FULTON. Mirror; yes.

Dr. MUELLER. As a matter of fact, the X-ray mirror is a metal disc.

Mr. FULTON. They are experimenting with those at the University of Arizona and they seem to be quite successful and active. I wondered if you looked into that phase.

Dr. MUELLER. The experimenters that we have are responsible for the development of the instruments themselves. They are aware of the development of the metal mirrors. There is a problem, however, with the grinding of them in terms of the techniques that are now available generally.

Mr. GURNEY. The orbiting solar observatory, was that built in-house?

Dr. MUELLER. That was built by Ball Bros. in Colorado. The Orbiting Astronomical Observatory is being built by Grumman. Some of the control systems are built by General Electric, for example. The system being assembled and integrated in-house but the various components and experiments are being built in industry.

Mr. GURNEY. Isn't this a departure from our previous method of operation?

Dr. MUELLER. It is. We have done this both ways in the past. For example, Goddard has built satellites in-house and has contracted for satellites.

Marshall has in the past developed the initial parts of equipments and then turned them over to industry. The first stage of the Saturn V is an example of that. This is not a departure from past practice. It does, however, represent two things. One is that as the Apollo program is phasing out, people are becoming available in the manned spaceflight centers to do other work.

In order to use their talents and develop their talents in this new area of technology, it has seemed to us important to have them do some of these things that are on the forefront of the technological developments of today otherwise they, in turn, will not be capable of directing other people. The second aspect is that we have had some limited funds in the past years and the only sources for this work were literally the people in our centers.

Mr. GURNEY. It seems to me that is not in keeping with our national policy which is to do as much of this work as we can in private industry, and I know that some private industry is very unhappy about this because they have expressed their feelings to me personally.

Why couldn't we do this by private industry? Why do we have to do it in-house?

Dr. MUELLER. I think there are two answers to that. At the present time, we need to maintain the capability and the talents that we have at Marshall and at the Manned Spacecraft Center. In order to provide the kind of direction, the kind of ability to solve problems that are needed in these centers. We are doing the same thing of course elsewhere in industry where we have special talents that are required for the on-going Apollo program.

In the long run, there is a need for competence and understanding and skill in the Government organizations that monitor contractors