

a large ground station with a big dish on the ground, which in turn rebroadcasts the television programs locally.

Now the political implications of direct TV broadcast are pretty clear. If a country wants to participate in a worldwide television and telephone service, it can arrange this under the present relay concept by buying a ground station for something like \$3 or \$5 million. With that ground station, it can pick up from the satellite whatever it wants to rebroadcast locally. The essential point is that the government that controls the ground station also controls the switch that permits it to turn programs on and off. If it doesn't like a program, it doesn't rebroadcast it. Now if we go with more powerful satellite transmitters directly from orbit into the home antenna, we could bypass these governments, something which might not be so popular with many countries. On the other hand, of course, such a system would be an extremely powerful tool for all kinds of programs from educational television to political propaganda. Fully recognizing that economic and political pitfalls exist, we should bear in mind that this technique is technologically within reach today. David Sarnoff, chairman of RCA, once said that with such a television system, we could eradicate illiteracy from the face of the globe within 10 years. I think this is no overstatement.

Well, I think I have said enough about improvement of man's lot on earth, but I would like to leave a message with you that we can indeed do a great deal with our present space capability to help man right here on earth.

This doesn't mean that we don't believe that space as an arena to advance science is important. After all, it is science that feeds the mechanism of progress. You had a briefing this morning about our astronomical telescope mount and its purpose to observe the sun in the light of X-rays, gamma-rays, and far ultraviolet. Because the atmosphere of the earth is opaque for these radiations, very little knowledge is available about the sun's appearance in the "light" of these rays. To those who would question why we should study a thing as obtruse as X-rays emanating from the sun, I would say that thermonuclear energy was first observed in the sun. Our hydrogen bombs today, as well as our efforts to generate thermonuclear energy for other purposes, is a direct result of discoveries made while observing the sun. And yet, all we know about the sun today is what we have learned in the region of visible light for which the earth's atmosphere is transparent. But when you look at the entire electromagnetic spectrum, this region is only a tiny little window. For most of the rest of the spectrum, our atmosphere is opaque, the sole exception being a "window" for certain radio waves, which has led to the new science of radio astronomy during the last few decades. Dr. Fred Whipple, head of the Smithsonian Observatory, once said that all we know about the universe is what we've learned through the dirty basement window of the atmosphere. This is certainly true, and I think we are liable to learn a great deal about the most fundamental processes at work in the universe simply by opening up this dirty basement window. We are about to do this now in our Apollo applications program by going out in space and observe and measure these ultraviolet, X-ray, and gamma radiations from the sun and stars.