I would now like to turn our discussions to the second AAP mission where we combine the AAP–3 and AAP–4 flights. The profile for this mission is shown on figure 3 and the mission objectives are summarized on figure 7. This mission will also be flown by a three-man crew launched by the basic Apollo CSM on AAP–3. AAP–4 is launched soon (within about 1 day) after AAP–3 and will contain a payload combining the ascent stage of an Apollo Lunar Module (LM) with a newly developed Apollo Telescope Mount (ATM). This new experiment module will contain several instruments developed to gather information from the Sun while above the Earth's atmosphere and should provide for significant advances in our knowledge of solar activity.

After launch, the CSM and the LM/ATM rendezvous and then conduct a second rendezvous with the workshop left in orbit from the AAP–1/2 mission (fig. 3). The various vehicles are "clustered" as shown and the station is flown in a Sun-oriented attitude in order to carry out the solar astronomy objective. Reuse of the orbital workshop provides for vehicle volume and a configuration arrangement wherein an open-ended mission duration of up to 56 days can be selected as a significant "next step" objective providing sufficient time to effectively utilize the solar telescope (ATM). This significant increase in flight time and the new objectives will again require both modifications to basic Apollo system and new developments (fig. 7). Here again, and in keeping with our time constraints, I plan to select one isolated area for further discussion so that you can get a feel in depth for some of the required AAP activity.

In conducting a mission of approximately 2 months duration, we must significantly improve our capability for providing supplies. One fundamental "supply" or "expendable" commodity is the various gases that are required to support a manned spacecraft. Our gas requirements for a 56-day mission are listed on figure 8. These elements all have a very low boiling temperature and they are used during the mission in a gaseous state. However, we can, by cooling these elements to very low temperatures, change them from a gaseous state to a liquid state and carry the necessary quantities at significantly lower overall system weights. Let's take one of our typical gas requirements and see what this weight tradeoff is for a 56-day mission and then examine what modification to existing systems might be required.

Oxygen is, of course, the most critical of our gas requirements and a summary of this expendable for 56 days of operation in the AAP–3/4 configuration is shown on figure 9. We see here that a total of 3,495 pounds of oxygen are required for creating a part of the vehicle atmosphere and for generating electrical power. (The CSM fuel cells are used to convert oxygen and hydrogen to electrical power and water.) Now, in performing a weight tradeoff for this amount of oxygen we see that it would require about 3,500 pounds of dry steam weight (tanks, valves, etc.) if we carried the oxygen in a gaseous state and only 960 pounds of dry system weight if we cool the oxygen to a temperature below the boiling point (i.e., cryogenically). This 2,450-pound weight saving is very significant. Therefore, we are planning to utilize cryogenic storage for oxygen on our