equipped with costly equipment of this sort. We have now a technical working group which has for the past 6 to 8 months been working specifically on a system description, such that manufacturers might utilize that description to produce prototype hardware which could be evaluated in flight. That group has incorporated in its system description the possibility of an abbreviated version which might come at lower cost, which would permit general aviation to participate.

Again we do not feel that this is necessarily the total answer for general aviation. In any event, our system description was completed at the end of June, some year and a half before people predicted we would be able to do it; and I think it is proper that we give thanks to the various manufacturers and to FAA who helped in that work because we never would have been able to do it alone. It is now anticipated that equipment suitable for flight evaluation will come from that system description and be available in the early part of 1969.

We agree that it is desirable to have a noncooperative, self-sufficient system, both for ourselves and for general aviation. We agree that it would be desirable to have a proximity warning device that would be noncooperative.

I might mention, sir, that we are familiar with the work of Mr. Adler, whom I believe you mentioned earlier today, and we have been in touch with him on numerous occasions. Some of the concepts and techniques have been embodied in our system description just completed. This entails the transmission and reception of radio signals among aircraft, which our system does involve. Unfortunately, the collision avoidance system is an exceedingly complex one. In essence, the black box is being asked to predict the future position of an aircraft that it knows nothing about.

Someone this morning, I believe, said that we can get a man to the moon but we can't seem to get a collision avoidance system. Strange as it may seem, we can predict where the moon will be a month in advance. But we cannot predict where an aircraft is going to be used a few moments from now. That is one of the fundamental difficulties.

However, we have come up with ideas, concepts, and techniques with which we hope that the flight evaluation program will prove feasible.

With respect to radar, which was mentioned as a possibility, airborne radar has constantly been looked upon as a potential for collision avoidance. The unfortunate part is that radar built specifically to see weather is more or less incompatible with a radar designed to look for airplanes. The air traffic controller has this problem today on his scope. When he first got radar, that radar was often obliterated by weather clutter. When they improved the radar to take out the weather clutter so he could see the airplanes, he now has the reverse situation. By the same token, the aircraft weather radar was designed to see weather and it doesn't do the best job to see aircraft. It has the narrow beam problem that Captain Ruby mentioned this morning.

Furthermore, there is the problem of ground clutter. The aircraft's height above the ground will be the distance at which ground clutter will appear ahead of the aircraft position on the radar scope. The crew is further distracted from looking out of the window by attempts to concentrate on a small radar scope in the cockpit. It is exceedingly difficult to ascertain which of these targets are targets of consequence.