



SATURN HISTORY DOCUMENT  
University of Alabama Research Institute  
History of Science & Technology Group  
Date ----- Doc. No. -----

APOLLO 6

PRE-LAUNCH PRESS CONFERENCE

Cape Royal News Center, Cocoa Beach  
John F. Kennedy Space Center  
National Aeronautics and Space Administration

Wednesday, April 3, 1968

3:30 P. M.

Participants

William C. Schneider, Apollo Mission Director, NASA  
George M. Low, Apollo Spacecraft Manager, NASA  
Clifford Charlesworth, Apollo 6 Flight Director, Manned Spacecraft Center,  
NASA  
Dr. Arthur Rudolph, Saturn V Program Office, Marshall Space Flight Center, NASA  
Rocco A. Petrone, Apollo 6 Launch Director, Kennedy Space Center, NASA  
Col. Royce Olson, USAF, Director DOD Manned Spaceflight Support Office,  
Patrick AFB  
Chris Kraft, Director of Flight Operations, Manned Spacecraft Center

Mr. King:

May I have your attention please? We're ready to proceed with the Apollo 6 prelaunch briefing at this time.

I'd like to cover a few logistics before we go into the actual conference here. We'll be open all night tonight. The phone number for any new arrivals who have not been with us before is 783-7781. We'll have somebody on duty all night and through the morning hours leading up to launch.

You've all been accredited. You have your badges. You have the instructions you require to find your way out to the press site at Launch Complex 39. You will be able to take your own transportation out there. There will be a guard who will direct you to the parking lot which is located right in front of the press site itself. We request that you don't go up on the mound at the press site, but bring your car into the parking lot in front.

We'll start a commentary at about 2 a.m. tomorrow morning, running about every half hour until the crowd grows a little larger. We will be giving a complete commentary later in the count. The countdown commentary will be handled from here until we clear the tower at liftoff at which time it will switch to the Manned Spacecraft Center in Houston.

In addition to your own transportation we will have a bus departing here roughly on the hour, starting at midnight, with its last departure from the News Center at 5:30 a.m. tomorrow. You all might keep in mind that it's possible there could be some pretty good traffic in the area as we get close to launch time and it might behoove you all to consider leaving early enough to not get caught in traffic at the last minute.

We'll have a post-launch briefing at the press site at T plus 60 minutes. This will be followed by a second conference, a post-mission briefing, which will occur about ten hours after launch. This also will be a two-way conference, with participants from both the Kennedy Space Center and the Manned Spacecraft Center in Houston.

I'd now like to introduce these gentlemen to you here, and one gentleman who is also standing by for us at the Manned Spacecraft Center in Houston. This will also be a two-way conference. We will first take questions from here and then switch to your colleagues in Houston so that they will also have an opportunity to ask questions.

To my right, here at KSC, Mr. George M. Low, who is Apollo Program Manager for the NASA Manned Spacecraft Center. Next, Mr. William Schneider, Office of Manned Spaceflight, NASA Headquarters -- Mr. Schneider is Apollo Mission Director. Next Rocco Petrone, who is Director of Launch Operations for the Kennedy Space Center, and Launch Director for the Apollo 6 flight. Next we have Dr. Arthur Rudolph. Dr. Rudolph is the Saturn V Program Manager from the Marshall Space Flight Center. And Colonel Royce Olson, who is Director of the Department of Defense Manned Spaceflight Support Office at Patrick Air Force Base. Also, standing by in Houston, is Mr. Cliff Charlesworth, who is the 502 Flight Director, the Apollo 6 Flight Director for this mission at MSC.

Mr. Kraft: I'd now like to turn it over to Mr. Schneider. Excuse me. I also understand, I'm sorry Chris, we also have Mr. Chris Kraft, who is Director of Flight Operations for the Manned Spacecraft Center, also standing by in Houston. Bill, would you take over please..

Mr. Schneider: Good afternoon, ladies and gentlemen. First I'd like to apologize for the hour and a half delay. I assure you we were working and weren't just loafing.

We have just completed our final review of the spacecraft and the launch vehicle and the entire complex as well as the network and the DOD forces, and we've completed our review of the weather, and everything is at this time GO!

The weather situation, as reported to us by the ESSA people, is basically that early in the morning the weather will be much like this, as it is out here today, that is, with clear and gentle winds, with deteriorating conditions toward the afternoon, with an expected wind velocity reaching as much as a peak of 25 knots sometime later in the day.

But we are on schedule and moving out for an 0700 launch tomorrow morning, that's 0700 Eastern Standard.

The close of the window for tomorrow will be dependent upon the conditions in the recovery zone. We have set a requirement that the conditions in the recovery zone be such that the onsite commander can give us reasonable assurance that he will be able to successfully recover the spacecraft. We expect the close of that window to be, if conditions are very good, on the order of noon or 1230 EST.

This is, of course, the final qualification flight on the Saturn V launch vehicle, since we have previously qualified the command and service modules and the lunar module for manned flight in previous missions. We are looking forward to having a good launch vehicle flight, and as a matter of fact, a good spacecraft flight, too, George, but as I said, the spacecraft objectives are on this mission, secondary. It is even conceivable that, and I stress the word conceivable, that the mission may have accomplished all of its primary mission objectives at the time of insertion into orbit, although, of course, that couldn't be determined for quite a long time.

We do have one, I shall not call it a dark cloud, but one question mark, and this is the question that kept us out at the Launch Control Center for the past couple hours. That is the question of a temperature that we experienced during the Countdown Demonstration Test on the S-II stage J-2 engines where some of the propellant pump discharge temperatures were a few degrees above what we call our redline values, that is the values that we expect to achieve for launch.

We have taken some corrective action and we have examined it. We think we've solved the problem. We have reasonable hope that we've solved the problem. However, there is no way to test whether we will achieve the proper redline without going through a cryogenic test and so the cryogenic test is going to be in the morning.

If, for example, we do not achieve this proper temperature on the first cycle we will be forced to do what we did during the CDDT, and that is, namely, cut off, stop at about 22 seconds or thereabouts and recycle back to about 24 minutes, then wait and assess the problem and see whether or not we can stabilize conditions again, and try again. Hopefully that will not happen, but it is a very distinct possibility.

With that, I'd like to turn it over to Rocco and ask Col. Petrone if he would now give us a discussion of how things have been going out at the Cape.

Mr. Petrone:

Well, we have been busy, as you know. We finished our Countdown Demonstration Sunday, then we had to recycle for the count and also work our way through some of the things we found in the Countdown Demonstration, but we succeeded in picking up the count at one o'clock this morning. We have a final 24-hour terminal count which we picked up at one, and at the time we left there -- as of now, I understand -- the count is on schedule. We plan a hold at the eight-hour mark, T minus eight hours. We plan a hold of six hours. We have no scheduled work and at this time it does not appear that there will be any necessary within that hold. We are on schedule with all of our checks, everything is going fine. So, roughly at 1700, in another hour and fifteen minutes, we will complete our task on schedule. We will have a six-hour hold and pick up again at 11 o'clock tonight for the final portion of the count of eight hours to a seven o'clock liftoff.

At 10:30 p.m. we will have a look at the weather to see if the situation has changed. Right now, the forecast would indicate that our morning time is the best time to go, that is Thursday morning. We will take a look at the weather at 10:30, then commit at 11:00 p.m., that is EST, at T minus eight in our count for the launch. At T minus seven hours we start our cryogenic tanking and shortly thereafter we will start getting cryogenics into the stage. Up until T minus eight hours we can sit there and recycle on a 24-hour basis. If we decide not to pick up the count at 11:00, and assuming we had no problem causing us to go in and change something, we could sit there and hold. We can do that through Saturday as we now see it. We could wait through Thursday, Friday and Saturday on our launch attempts, assuming for some reason at T minus eight hours we do not want to pick up the count, other than for hardware difficulties somewhere in the program.

Once we get our cryogenics aboard the stage we then are in the position of a 72-hour recycle. These are my conclusions on where we have been and what we have been doing since our CDDT ended, and now we expect to pick up the count at 11:00 p.m. for a launch at 7:00 a.m.

Col. Olson:

Department of Defense support for this mission is essentially the same as it was for Apollo 4 -- 501. We have roughly 45 aircraft and 11 ships involved. We are taking advantage of this unmanned mission, of course, to further train our crews and check out the equipment on the new resources that are coming into the

inventory to support Apollo, such as the Apollo ships and the ARIA aircraft. There will be two aircraft in the Hawaiian area for reentry, there will be three of them out here in the Atlantic. There are three Apollo ships involved. One of them, the Mercury, is sitting out here in the port, but we are getting training as the spacecraft passes over, so if you're interested in Apollo ships, there is one right here at the port.

Question: I'd like a recap on the postponements, the seriousness of them, etc., from March 21. There have been five postponements, is that correct?

Mr. Schneider: I don't know the numbers. We did start out for March 21. We did have a number of minor problems, normal problems. Perhaps Rocco would like to go into them.

Mr. Petrone: Those of us working in the program, doing the job day by day, perhaps don't see much of the calendar shifts -- there are shifts throughout our schedule. I can't think of anything -- you see, in the CDDT we did have three attempts. On one attempt we had a leak in the facility, that we had to repair. On a second attempt we had fuel difficulties. So it was those kind of problems that went on and moved us from the 21st to the 4th -- throughout our preparation schedule. I can't recall a single large item that we changed out. There was additive work, things took a little longer and on some of our tasks, either we didn't hit it the first time or had to go back in and change a component, but there was nothing significantly large that gave us a two week slip by itself. There were many additive situations.

Question: I'd like to ask George Low if all the objectives of the spacecraft are regarded as secondary as far as he is concerned, is there anything that could happen to the spacecraft, including washout or failure to recover, that might make you want to have another preparatory flight before manned flight?

Mr. Low: Well, I have to say yes to that question, but I can't give you a more specific answer. If we should lose a spacecraft because of a spacecraft failure, we would have to look at that failure to determine whether we would need another flight or can solve it by ground test or analysis or what have you. These questions are very difficult to answer before a flight, but come very easy after a flight.

Question: For Mr. Schneider or Mr. Petrone. Can you explain in a little further detail the J-2 pump discharge problem?

Mr. Petrone: We have a redline that we have to achieve in order to assure that when your turbopump starts pumping your liquid oxygen or your liquid hydrogen into your engine, that you do not cavitate. The term means that you don't convert the fluids into gases, because you want to deliver liquids. You want to deliver a good solid liquid. This has to do with temperature and pressure. So we have a temperature reading that we look for at the engine inlet. The redline we're looking for and we're set at, is minus 286 degrees Fahrenheit. It is now, with looking at the engines specifically and having run through our Countdown Demonstration Thursday, we have, in effect, raised that two degrees to minus 284 and what you're doing here is looking for a number that will assure that the pumps function properly so that the liquid doesn't gasify as it goes through the pumps. These are very cold liquids and as you sit there, you tend to pick up heat, just by virtue of the fact that they are cryogenic. So the whole question of a redline on an engine, and it has to do with these particular engines and the head that you have on it, the prime purpose of it is to prevent cavitation or to prevent the liquids from being converted to a gas before you get to the injector of that engine.

Question: May I follow up on that?

Mr. Petrone: Yes.

Question: This was on the oxygen side, rather than on the hydrogen?

Mr. Petrone: We had actually, Bill, three on the oxygen side and one on the hydrogen side. We had one hydrogen feed line and three oxygen feed lines in the second stage wherein we were, say, a few degrees hotter than the redline limits.

Question: You don't redline hydrogen at any temperature as high as minus 286, do you?

Mr. Petrone: No. The number I gave was for oxygen. Hydrogen is minus 420, if my memory serves, minus 420.

Question: Can you account for the heat sources?

Dr. Rudolph: No. Really, this is not so easy to explain. We know that there must be a change in the heat source, but what it really is we are still struggling with. It could be.....

Question: Is this a novel situation? Has it ever happened before?

Dr. Rudolph: It has not happened before.

Mr. Petrone: It did not happen on 501. However, it has been seen on prior programs.

Dr. Rudolph: Maybe I can say the following. Since this compartment where these engines are we can only test here at the Cape for the first time, not in our captive firings on our test stands, and therefore the conditions are entirely different because now the engines are enclosed and are between the oxygen tank of the second stage and the oxygen tank on the first stage. So we have to deliver heat to protect against too much cold. Now any slight change in the construction, an insulation change, would affect the condition in there. We have taken corrective action by improving insulation and as Rocco already mentioned, we changed the redline so we can accept a higher temperature, but what it will really turn out tomorrow morning, we don't know for sure.



Question: One part of my question may have been answered. You changed the redline. Was that the figure you gave, Rocco, two degrees difference; and how much different was it; was it the CDDT when this turned up? How many degrees was it past the redline value?

Mr. Petrone: It was about four or five below---or hotter---with these temperatures we're working in the negative. We were five degrees warmer than we wanted to be and there was some variation between the engines, but about five degrees.

Dr. Rudolph: That was the worst one. The others were better. Now here we can, we have done some improved insulating and I think it will contribute to a better condition and also, we changed the redline. We give two degrees, so that we think will get off in the stock box, what we call it. The engines are very sensitive to temperatures and pressures and that should do the trick. Again, we are not sure.

Question: Is this only on the S-II?

Dr. Rudolph: That's only on the S-II.

Question: What is getting too hot, the cryogenics or some of the metal?

Mr. Petrone: The cryogenics. The cryogenics under the head and under the pressures in effect get superheated and that's what this increase in temperature is.

Question: This is for Mr. Schneider. Last week Bob Moser told us that his people are anxious to get the 503 vehicle out on the pad within ten days, if it has to be unmanned, and he'd like to have a decision from you within seven days whether it's going to be manned or unmanned. Could you give him one in that time?

Mr. Schneider: Well, I'll hasten to state that the decision is not mine. (Laughter).

All I can say is that the decision will be made as soon as there is an adequate analysis of the data, so that we can determine whether or not the mission satisfied all of our requirements. As a little aside, it's difficult sometimes at the completion of a mission to determine whether or not it is a completely successful mission, because you've got to await analysis of all of the data. You can have what appears to be a perfect mission and if you had a telemetry link go out or a multiplexer go out and have no data from the technical standpoint, it's a complete failure.

Similarly, on the other hand, you can have one where things change considerably during the mission, such as what happened on Apollo 5, but you get all of the data that you've been really looking for in the flight. So it will take some time to make that decision and we all know how everyone wants the decision as early as possible. So that's all I can say now.

Question: To follow that up, if you don't say have a decision within ten or twelve days but it still looks good, would you hold up the rollout of the 503 to the pad?

Mr. Schneider: I think we'd wait, that we'd hold that decision and make that when we see how good the data is or how bad the data is. We'll make that depending on how it looks.

Question: Regarding the engine, again. Did this affect all engines and secondly, at what point will you know whether it has been solved?

Mr. Petrone: It affected three of the five of the liquid oxygen feed ducts and one of the five of the liquid hydrogen. We will not know we have solved it to proceed with the mission until 22 seconds before liftoff.

Question: For Bill Schneider. Bill, you said it's possible all the primary mission objectives will be accomplished by insertion into orbit. What has to be accomplished by insertion into orbit to meet all of your primary objectives?

Mr. Schneider: Well, let me hasten to add that all of the primary objectives, as listed in your press kit, do include an S-IV-B restart and we will be mightily disappointed and will not consider the mission a complete success if we do not get that. What I am saying is that, if for some reason or other we do not get a restart, we may and I hasten to say "may", we may have sufficient information to make a proper decision on whether or not the Saturn V is ready for man rating. We will not know that until long after the flight, because that would be as a result of careful analysis of the data.

Question: I'd like to go back to the heating problem, just for a moment. When the... This problem occurs, as I understand it, as the cryogenics are being pumped into the tanks?

Mr. Petrone: No. The problem actually is seen when we go into automatic sequence at three minutes and, I believe, seven seconds. We started pressurization activity. The cryogenics heat up under the pressures. These are the flight pressures that we're building up. Now what we have to do is read, and we do this on every flight, we read the temperature at the inlet to the engine. We establish a band width. We call it a redline and we say we must be within that band width or below that redline in order to function properly, and on the S-II you're reading a value on the ground and actually the engine isn't going to ignite until some two and a half minutes, so what you're doing is extrapolating a ground condition into what it will be two and a half minutes later, but you see your temperature rise, in your automatic sequence. It's the only time we can see it. That's the reason Dr. Rudolph mentioned we've got to go through our terminal sequence. We'll be reading these values and our times are down to minus 22 seconds. If we are within the redline, we would then proceed. If we're not, we plan to cut off.

Question: At the time the fuel is injected into the engine, in which state is it? Is it liquid and then it gasifies in the engine?

Mr. Petrone: You go through the injector as a liquid with your liquid oxygen. The difficulty comes at your pump if you start to cavitate or build up an air bubble there. The pump will not work efficiently and therefore your mixing ratios are entirely different than what you've planned and you can get any mixing ratio, which can lead, of course, to many consequences, whether it would go in the engine properly, or whether you would get too much fuel and not enough oxygen, but basically, what you do, is you're upsetting your ratio of fuel to oxidizer going into the engine.

Dr. Rudolph: And you want to start fuel rich, not oxygen rich. Both are liquid.

Question: For George Low. George, what's the status of the spacecraft for the 503 mission? Where is it and how soon can you bring it out to the VAB to stack it, assuming that the flight tomorrow is a success?

Mr. Low: Are you talking about a spacecraft for an unmanned or a manned flight? Well, George, that would be command module 103, which is about to go into checkout in Downey and LM-3 which has been in checkout at Bethpage for some time. Neither one of these vehicles are scheduled for delivery here until summertime.

Question: I'm a little confused, then, on the basis of Howard Benedict's question and then the answer to this last one, what is the sweat about moving the next Saturn V out to the pad if you don't have the command module and the lunar module for the manned flight here?

Answer: Well, because of some of the interactions in getting some of our work done out on our remote sites, some of the programs that must be put in. We have a situation where our missions are pressing one on the other.

Answer: I believe we've got a boilerplate on 503 now, and if the decision was made to fly unmanned, and what we have planned and brought up to this point, we have on board a boilerplate spacecraft with all the weights and the simulations in there and that's what would fly.

Question: And you'd want to get that out in a hurry in order to make way for 504, which would then be your first manned flight? But.....

Answer: That's our planning as of today. We've brought the 503 to the point of checkout, where it's near rollout within these ten days that Howard mentioned. Now we'll look at the results of 502 before we make further decisions. We have brought it to the point where the boilerplate that would fly for the eventuality that we have to launch it, we would not wait on another delivery of a spacecraft. I believe that was the question that was raised.

Question: In other words, if you decided that you were going to have another... if you decided that your next flight was going to be the manned one, then you would not be in a hurry to get the Saturn V out of the VAB?

Answer: That's correct.

Question: Two more brief questions on the temperature problem. Rocco, I'm still not sure whether one of the J-2 engines or two of them were not affected in any way by this problem, and secondly, do you have any indication of why they were not affected and the others were?

Mr. Petrone: It turns out that the three that were affected by liquid oxygen and two were not. The one that was affected by liquid hydrogen was not affected by liquid oxygen. So we had the center engine that we ran hotter on the liquid hydrogen that did not, that was within

the redline, on the liquid oxygen. So what you have is a case of three engines where they're out of spec. on liquid oxygen and one engine out of spec. on liquid hydrogen, not the same engines.

Question: Can you explain in anyway why the first engine did not have this problem on either side?

Mr. Petrone: No....

Dr. Rudolph: No, the fifth engine had the problem on the hydrogen side, the center engine, the hydrogen side, and it has a longer feed duct. You see, the feed duct comes down the side of the stage and then goes to the engines, and they are not all down on one side, but are distributed. Now then, the lines are equally long for the four outer engines, but the center engine, being farther away, needs a longer feed line, so it is therefore more sensitive to any temperature changes which might occur in that stretch of the line to the center engine.

Mr. Petrone: It's a function of geometry and heat distribution, as Dr. Rudolph mentioned. The flow in that interstage, the only time you see it is here at the launch site. The only time you have a first stage to sit on top of and therefore the fuel conditions you get. We have electronics in there and actually we must pump warm air in there. Now you get a series of factors so that you end up with a result and there's going to be some movement of values, the inlet temperatures, and literally, one can only experiment with it here to see what the end result is going to be. It cannot be done on a test site.

Mr. King: We had two patient hands in the front row and there's a third hand up now. We'll take these two questions here, then we'll go to Houston for questions, then we'll come back here for anybody who has questions. Go ahead.

Question: Another question on this heat problem. If you go to T minus 22 seconds and have to hold, will that be a prolonged hold or.....

Mr. Petrone: We will not hold at T minus 22. At T minus 22 seconds, anywhere after three minutes seven seconds, we will revert back, we'll go back to T minus 24 minutes.

Question: Is there some quick fix or do you have something in mind that you can make a change to get the temperature down again?

Mr. Petrone: By observing the particular trace of the temperature, we'll be watching the temperature on the recorder and have it plotted. There are adjustments, such as inlet temperatures of that interstage. That is one adjustment we can make.

Dr. Rudolph: We also expect that we had during the CDDT, that on the second round as we call it, the situation had improved. It did on the first attempt, or rather on the second attempt, during the CDDT, improve. Only one LOX side was out of the specs. or the redline.

Question: I believe this is for Dr. Rudolph. At an earlier briefing, Bob Moser told us that if we go manned on 503, the S-II stage will go back to Michoud for man rating and certain modifications. He specifically mentioned possible relocation or strengthening of the baffles, the LOX baffles which have given some trouble on 501. Could you pinpoint this and explain a little bit about it.

Dr. Rudolph: Yes, you talk two different issues at the same time, so that we talk first about a one where you mention the second stage, the S-II would go back to the test site. That's correct. We would indicate that 503 would be manned, take the second stage, ship it back to the Mississippi Test Facility and make a cryogenic proof test, so that answers one question, I believe. The other one is that during the 501 LOX loading in the S-II, we had damage of baffles and in order to save time during the countdown and avoid crew fatigue we want to go to a fast fill on 503 manned. Now since we had this problem with the baffle damage of 501, we have to do something to the baffles. Strengthen them for instance.

Question: What? Specifically, how?

Dr. Rudolph: Well, we, for instance, changed the baffles, which are shaped like a rhomboid and sit down at the bottom of the LOX sump. We took the lower half off, so in a way, we took them out of the stream of the incoming liquid oxygen. That helps, but we also have to study the flow dynamics inside. It isn't all that simple. As I say it here, and again, you can only find that out by testing, not by analysis, by sitting down at your desk and trying in your mind to figure out what the forces are. Anyway, we think we, by also making certain changes to the facility, Rocco, understand the problem well enough that on 503, manned, we can fast load again.

Mr. King: Thank you. We'll now switch to Houston. I understand both Mr. Kraft and Mr. Charlesworth have a statement.

Voice: This is Houston. We have one logistical announcement to make first. The Houston News Center will be open until ten p.m., Central time, this evening and reopen at four a.m., Central time, tomorrow morning. Next we'll hear from Mr. Kraft and Mr. Charlesworth.

Mr. Kraft: I would like to point out that this is another unmanned flight of a manned vehicle and therefore another complex job for the flight control and ground crew to accomplish. There are a large number of things that we can and may have to do and it may be a difficult mission from that point of view. The other point I would like to make is that we have been making a large number of modifications to the whole network over the last two years and this flight in itself is sort of a dress rehearsal for our upcoming first manned flight of the 101 Spacecraft. We have made a lot of changes, we've added a lot of equipment and we feel now that this flight will be proof that all of that equipment is ready to support our manned space flight program.

About all I would like to add that we have completed our training to date with what I think is good results and it seems prepared to do whatever is required to be done. In terms of the facilities, our ground support facilities, computers, network, etc., are proceeding along normally with our part of the count to meet the pad's. We have no problems at this time, and based on past testing support and the CDDT we don't really expect any and we expect to be ready to meet the pad launch in the morning and have a good flight.

Okay, we are open now here in Houston for questions.

Question: Assuming a launch tomorrow morning, has anyone recalculated the apogee and perigee of the S-IVB, and how many degrees it will miss the moon, and whether it will come back to earth?

Mr. Kraft: Mr. Charlesworth has. I've got a few numbers, I knew someone would ask. Assuming we launch on time, the best information I have is to expect the apogee of the S-IVB to be some 279 thousand nautical miles. With a perigee, that is when it comes back to the earth, of around 1700 miles, with a period of some 16 days. Now we don't expect it to enter essentially the area of the moon's sphere of influence, if we go on time. Now, if you try to pin me down with launch delays or different days I can't honestly answer it because it is a variable depending on the time of the day you launch, location, day of the month, etc.

Question: What about in reentering the atmosphere? Will it come back and do that under the present plans.

Mr. Kraft: The first time out it doesn't look like it will, but the next time around if we get into the sphere of the moon's influence because of the trajectory, it could. It's probably a good probability that it will come in.

Any further questions from Houston here?



- Mr. King: Thank you. We'll continue the questions here as has been the practice and is the practice once again. Mr. Schneider passed on a note to me to remind me that he does have an airplane to catch. We will continue this for a short while.
- Question: If we had to put a dollar value on that beast out there - from the top of the LES down to the base of the model - what would that figure be?
- Mr. Lodge: We don't judge our program that way. It's kind of meaningless. There are so, many things that you don't see that you pay for that there is no real way of coming up with what the dollar value is of that. The dollar value is immense when you consider the value to the United States. The value to the United States is incalculable. What it costs, I don't have any way of figuring out.
- Question: Rocco, how many times is it feasible to recycle back to 24 minutes. Would you do it just one time or...
- Mr. Petrone: No. We have a multiple opportunity. We are looking for a maximum of four. That is going to depend upon many things. As far as gaseous hydrogen that we use to charge our bottles for the J-2 engine, we feel we have 4 recycles that the time duration goes back to T -24 does not mean we will go back and pick up and then go in again. You have to look at data, look at the values, look at the occurrences, the trends, temperatures and all, and wait for certain things to stabilize and then go in again. Right now we are hoping we have worked these values so that the first time through, of course, is our best guess. We will, based on what we see and what we know happened Sunday be able to plot two points on the curve and make another extrapolation forward at the second attempt.
- Question: I am sure this will be an easy one. How much damage from a monetary standpoint did this first Saturn V cost to the pad and how long did it take to fix it, and have you taken any steps to perhaps have less damage this time?
- Mr. Petrone: Yes. We have taken steps to have less damage. The items of the pad and launcher are somewhat separate. The launcher gets a little more damage than the pad itself. We would anticipate that, say for an average launch and what we found in 501, that we could have the pad in shape within 10 days to receive another launcher. The launcher itself is going to take longer - in the neighborhood of three weeks, and maybe four. The monetary value - we have not

collected as part of our refurbishment and maintenance, if you go into maintenance items and refurbishment. However I must say that I was most pleased with the very limited damage on the 501 and I only hope it is an indication of what we will continue to see in the future. It was very, very minor in the larger picture.

**Question:** Well, from a money standpoint, can you give us the ballpark. Was it under one hundred million? - It was more than \$10. Somewhere along there must be fairly close.

**Answer:** That's a pretty big broad spectrum you put out. Why don't we just use that?

**Question:** You must be able to do better than that.

No - let's say yes. It's between those two numbers.

**Question:** Aviation Week in the current issue says that if tomorrow's flight goes well, there is a good chance that the manned flight to the moon could go in the first half of 1969. Would you comment please?

**Mr. Low:** There can be a lot of problems to take yet between tomorrow's flight and the first flight to the moon. We have to get manned flight in Apollo in earth orbit and we have to do a number of earth orbital rendezvous flights on the Saturn V, and then with the LM and the CSM. I think it will be a most difficult job to get the lunar landing by the end of 1969. I think we've got a very good chance of doing that.

**Question:** I sense a certain reluctance to talk about money. However, I have to press this question a little bit to Mr. Schneider. In testimony before the sub-committee last March 16, 1967, I believe it was, von Braun put a price tag, a fairly precise one of \$205 million for a launched Saturn V. People at NASA tell me that that figure is still kind of hanging and that's alright. Now if von Braun can be as precise in 1967 when asked by Congress about the price of a vehicle, why can't we be equally precise in 1968 when asked by the press. I don't agree that this is just an editorial comment is passing - it is kind of meaningless to talk about the price of anything.

**Mr. Schneider:** I am the mission director - not the Senate director. As mission director I couldn't even tell you what our budget is. I am not in that business. That's why I cannot answer that question.

- Question: Well, can anyone?
- Answer: Nobody here at the table has the answer for you and we will do our best to get it for you. We'll check.
- Question: For Bill Schneider. Bill, just so I fairly accurately understand this point. If you don't get a second stage burn of the S-IVB, have you met your primary mission objective? Can you man rate for 503 and start manned flights with 503?
- Mr. Schneider: The answer to the first one is no. We would not have met the primary mission objectives as stated in the document because they do include an S-IVB restart. The answer to the second question is - it is perfectly conceivable that after analysis of the data we could find that the reason for restart failure had no implications on whether or not the vehicle was man-ratable. The first planned Saturn V mission does not currently include the manned restart of the S-IVB.
- Question: For George Low. Why is the new hatch being flown aboard this spacecraft other than the fact it was ready.
- Mr. Low: I guess you have almost answered your own question, Joe. We did at the time we made the decision on the new hatch know that we could not get it on Spacecraft 017. We knew we could get it on Spacecraft 020 so we moved it out and put it on 020 to get the best possible test of the hatch at the speeds, heat transfer rates, etc., but we have completed some very satisfactory ground tests. We have more to go and also we have seen the very low heating rate in that area on Spacecraft 017 so that since that decision was made we have convinced ourselves that we don't need a flight test of this hatch for man rating purposes.
- Question: I have two short questions. The first one is what is the official lifting capacity of the Saturn V.
- Dr. Rudolph: 100,000 pounds.
- Question: 100,000 pounds? Then this is an increase of 10,000 pounds in about the last three or four years is it?
- Dr. Rudolph: No. For the last 2 years, if my memory serves me right, 98,000 pounds.

Question: Second question. The S-IVB trajectory, and I suppose this might go to Mr. Charlesworth in Houston. I believe this is one of the few and possibly the only circumlunar trajectory that we have flown. Possibly there has been one, or maybe a scientific experiment has flown this way. As I understand it, this is an orbit that goes around both the Earth and the Moon - is it not - am I wrong about that? I see Mr. Schneider shaking his head. Well, I can just add this. Is this the kind of trajectory that one would fly if one were flying men around the moon?

Answer: In terms of energy imparted to the trajectory, yes. In terms of the actual targeting, no. We are essentially shooting for a fictitious moon, so to speak. We do not expect tomorrow for this trajectory to go around both the Earth and the Moon. We do not expect it to enter into the sphere of influence of the Moon.

Question: I'm a little bit confused about this S-IVB. We were told by Mr. Charlesworth that we had a 279,000 nautical mile apogee and a 1,700 nautical mile perigee. That is from the Moon, is that right, or from the Earth? You just told Dick Lewis it did not go around both of them. Will somebody please maybe use a blackboard and tell us what it is going to do.

Mr. Charlesworth: It goes out to lunar distances, but it does not go around the Moon itself.

Mr. Schneider: It is a highly elliptical orbit that at its closest point comes within 1,700 miles of the Earth and at its furthest distance goes to 279,000 miles from the Earth.

Question: What is the lifetime?

Answer: The period is 16 days.

Mr. Charlesworth: The period for this orbit, this highly elliptical orbit, is 16 days. When it comes back through and starts up, depending on where the Moon is, we will probably get some perturbations, it is difficult to predict--I can't predict--what will happen on the next pass. It may very likely return to Earth. Let me point out that for the figures used for the S-IVB that if you are off only a few feet per second or several tenths of a degree it is going to have a tremendous effect on the apogee and perigee relative to the Earth. So you shouldn't take those numbers as gospel.

Question: I just want to reiterate this point since it was raised again. As I understood, the ascent part, the orbit of the S-IVB would go around the Moon and then on its return would go around the Earth and then go back up to the Moon.

Answer: Why don't I draw you a picture after we're done here.

Question: One more time on the J-2's. Did you detect this problem in the CDDT? And also in some way you detected it today. I'm confused on that.

Answer: Just on the CDDT. Sort of been living with it ever since.

Dr. Rudolph: Yes. Discussing it, analyzing it, looking at what shifts we should make. But in order to detect it, you have to have cryogenic support and go through your terminal sequence.

Question: The fuel flow has to start before you detect it?

Dr. Rudolph: You don't have to start fuel flow. No, you've got static conditions of the fuel in the pump. You've got a valve downstream of that pump. When you are measuring your temperature and pressure, geometry-wise - just above the entrance to the engine itself. You do not measure the flow. We get the flow at ignition on the first stage. On the second stage there would not be flow until you start, actually 2-1/2 minutes into the mission.

Question: Mr. Schneider, if for some reason you are unable to man rate this vehicle tomorrow, how firm are your plans to go to a dual launch concept using the Saturn IB after the 205 flight?

Mr. Schneider: We have that in our plans and we will retain it in our plans. However, if we do not have a satisfactory flight on this one, the 502 flight, our current plans are to go out with 503 boiler plates. Now if we do that and that is a successful flight then it is conceivable that we would go to the Saturn V manned launch on the 504 and not do a dual launch, but we will retain that capability until some later date.

Question: Jack, any pilots in training and if so how many and will they be watching it tomorrow.

Mr. King: We are supposed to be getting a list, George, of which astronauts will be here for the launch. I'll check on that as soon as this is over and whatever information we have we will be glad to pass it on. I certainly expect we will have it by tomorrow morning.

Question: I would like to ask one question. What are the reasons, all the reasons for the S-IVB shooting for this fictitious moon target?

Dr. Rudolph: You would exercise the antennas on the stage and find out whether you can communicate. That is, whether you can receive signals or can send signals up and have them bounce back. There is certainly one very significant advantage and you would also find out whether you achieved your velocities you are looking for.

I would like to add something so that there is no misconception. The S-IVB has a guaranteed life of about six hours, but we hope that will go on to about 10 or 11 hours. As you heard earlier, this has a 15-day period, so we would only be able to get actual signals back from the S-IVB for those first 10 hours - not out at lunar distances.

Question: I would like to pursue Mr. Lewis' question further. You said that the Saturn V is now rated to lift 100,000 pounds. The present weight, the payload for tomorrow, comes to just under 94,000 pounds, according to the press information. However, this is only a 6,000 pound lunar test article. The real load, as I understand it, will be about 32,000, maybe more. If we add this 6,000 we will just barely make it with 100,000 pounds of payload in a vehicle capable of lifting 100,000 pounds. Very marginal. Maybe Mr. Low would like to answer.

Mr. Low: True. We do have a weight problem in Apollo. Command Service modules and the lunar module are essentially at the limit of weight that we can fly. We have the situation under control, the command/service modules remained steady enough though at their current weight for the last 4 or 5 months. I am talking about the command/service module from the Block 2 vehicle that will be on the lunar mission. And we still have some margin left. The situation on the lunar module is somewhat tighter since we made the post-accident changes somewhat later and we did not get the weights on the control as quickly, but they too are leveling off now and with very tight weight control and some possible weight reduction I am confident we are going to make it, but we essentially are at the limit.

Mr. King: I am afraid we are going to have to terminate the conference now. Thank you very much.