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PARTICIPANTS:

Frank Borman, Commander
James Lovell, Command Module Pilot
William Anders, Lunar Module Pilot

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HANEY I hope this is a start of a pattern. I hope you will note the time. This is an on-time press conference, first one we've held. I'm sure since the announcement everybody has a lot of questions of the crew, how they look at the flight and so we have asked Frank and his team to come over this morning and discuss both the flight plan, as it stands right now, and the training aspects that will go into the mission, Frank.

BORMAN Well, I read over the press conference that General Phillips and Dr. Mueller and Dr. Paine had in Washington and I thought they went into pretty great detail into the actual flight plan and the mission. I guess we might start by saying that we started training for this particular mission in August and we have been pursuing it rather heavily ever since. We are very happy about - of course about being able to at least plan and, hopefully, fly this mission. I think that one thing that might be a little different than any of the other missions we've had is the fact that we've done a lot of specialized training. Bill Anders is really the systems man and Jim Lovell knows the navigation and the MIT equipment very well. I told Chris the other day, I'm kind of like him, I don't do anything but kibitz, so it's a - it's a -

LOVELL Bill and I agree on that.

BORMAN (laughter) It's been a rather hectic 4 months, but it's been, I hope, a profitable one. I think - Jim and Bill, do you have anything you would like to add? Perhaps the best thing to do is to let each one of you have a few words and then answer questions.

LOVELL Well, I just want to comment that it - of all the flights that I have worked on, I think this is of course the most interesting. It has a lot of interesting aspects to it. The flight plan itself has been well known for years, but we have finally just worked into the details and when you really get knowing that you are going to start planning for lunar voyage, there is a lot of little details that suddenly come out of the woodwork and we have found these things out and if nothing else, we kind of feel that this flight has set the pace to begin in earnest our lunar landing Apollo program, Bill.

ANDERS I started this training out - training out about 2 years ago as a lunar module pilot, training on LM 4 and supposed to be an expert in that vehicle and now, all of a sudden, I find out I'm the expert in - supposedly in the command module system, plus being a photographer. But, it certainly has been interesting training and I'm sure we are going to find the flight a heck of an interesting

ANDERS flight.

QUERY How dangerous will it be, orbiting the moon for 3 days? What are the risks as you three weigh them?

BORMAN Well, Jules, one of the features of this flight plan of course is that we have decision points along, as we did in any of our earth orbital flights. Of course, the first one will be whether we commit to a translunar injection or not. So after approximately two revs, we will either commit or else we will stay in an earth ortital mission, and so we have a decision point there. But even if we do commit to TLI, we have regular abort times along the course to the moon, so that we could - in case of a system problem, we could stop at any time and come back. Then we finally reach the point where it would be swifter to just go on around the moon than it would be to try to abort. The next great point is before we burn lunar orbit injection, before we slow up to go and frankly, I think this will be a very conservative - I will have a very conservative approach to this burn because it is a burn that once we have a problem, if we have a problem after this burn with the propulsion system or something like that, we would be in trouble. So I say we won't burn LOI unless we have a perfect spacecraft.

QUERY Once you have done the lunar orbit injection burn though and you are committed for really 10 revs or 20 hours, how dangerous is it then, how much are you concerned about not being able to get out of lunar orbit?

BORMAN Well, you see, we are really not committed for 20 hours, because we have abort data every 2 hours. We can come back at 2 hour cycles. So really, I'm not concerned at all. The mission, if all works well, will be a relatively simple one, and I don't thing we are biting off more than we can chew. I think it's a conservative mission, it's one - you know, we designed the Apollo, we said we were going to the moon, and as Jim pointed out, finally when we get down to examining the details and saying we are really going, people start getting a little queasy about it. But I have no hesitancy about the hardware.

QUERY Captain Lovell, what would you - how would you assess the criticality, or the risks involved, when you return to earth, that is, the reentry and so on.

LOVELL Well, I think that the previous spacecraft had proven out that the return to earth, the reentry, is not critical. I think we have good handle on the navigation such that we can hit the entry corridor. I personally don't feel that that is a real critical part of the program.

LOVELL Certainly it will be interesting and we will all be looking forward to it, but I don't think the risks are any greater perhaps, than other portions of the mission.

QUERY What would you say is the most critical point in the flight?

LOVELL Well, like Frank pointed out, the worst critical point in the flight, as far as decision making goes, is the LOI burn. The most critical point of the flight, much similar to a retrofire in earth orbit, is the TEI, or the transearth injection burn. The engine has to work at transearth injection for us to get back out of lunar orbit.

QUERY Jim, what sort of things will you be doing in lunar orbit in the way of navigation?

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QUESTION Jim, what sort of phase will you be doing in lunar orbit in the way of navigation?

LOVELL I'll be taking sightings on the proposed landing sites, or pseudo landing site which has the proper lighting conditions. I'll also be taking navigation marks on control points on the far side of the moon; that area where we don't have a good idea on the coordinates. At the same time I'm doing the navigation, Bill, and I think you ought to cover this, will be taking photography of certain areas. Bill, you want to continue?

ANDERS We have several passes scheduled for strip photography of the lunar surface in order to get a better idea of some of the portions of the moon which the Orbitor didn't cover too well. This will help us in tying down a lunar grid for our lunar landing missions and will also assist us somewhat in being able to determine the exact position of the spacecraft, to see if the orbit was perturbed at all by any nonhomogeneity in the lunar surface. We will also be doing photographs of the landing site or sites that are available depending on what day we go, the ones that Jim is tracking on, and we'll be doing some dark side photography with some high speed film and we have rougly 1200 exposures available to us which we'll be using, photography opportunity of various kinds. We also have a 16mm camera onboard which will be used to do tracking of landing sites for training of future films and general lunar surface analysis.

HANEY It would be interesting if one of the crew could set up the lighting conditions, perhaps with a blackboard if we can get one, or with ashtrays, or with something.

QUESTION Bill has one.

LOVELL One important point that I think must be brought out is the fact that the lunar orbit operations is primarily a check on the tracking of the spacecraft by MSFN. Something which we really need before we do any type of a lunar landing operation; that's one of our major objectives in going into lunar orbit.

HANEY Translation MSFN, Manned Space Flight Network.

QUESTION Colonel Borman, have you, because of the I won't say extra risk involved, because of the uniqueness of this particular flight, have you prepared your family, have you told your family anything particularly different?

BORMAN No, we haven't - I haven't, I don't know whether Jim - we haven't been home much to talk about it. I am very sincere when we - I think a lot of people have a perhaps an improper impression about how we weigh these

risks, cause as you know, I was on the board that investigated the fire, and then I was involved in some of the decisions that were made in reengineering the Apollo, and I wouldn't get in the thing if I didn't think it was a safe vehicle, and I don't believe any of us here, I don't think the wild blue yonder, silk scarf days are gone; I think it's a very conservative, a well thought out, and a mission that we've been planning to fly for almost 10 years.

HANEY I can vouch for the fact that he doesn't tell his wife much cause I talked to her at 8 o'clock this morning and she said, "What press conference?"

BORMAN If you talked to her at 8 o'clock this morning, you are in trouble.

HANEY You left at 7.

BORMAN I did, but she was still asleep.

HANEY A more serious question.

QUESTION I am from West German TV channel 2, and we are to put this partly on a Christmas Eve special telecast. Now being a German, I am of course a little sentimental about Christmas, and so I was thinking that you will be very far away from your families, farther than ever man has been, and so I wonder if NASA has made any arrangements since you have to save weight and volume, that your wives can take some parcels and give them along with you on the trip which you can open while you are whirling the moon?

LOVELL We have about 115 pounds of recreation we can -

BORMAN No sir, I don't believe that we - as you know, every pound is critical, and not only that we have a problem with the flamability of the items. So everything that goes on that spacecraft is carefully controlled and the materials that go in it are scrutinized. Some people have been kind enough to send us books and so on already, but we won't have that option this time.

QUESTION And even your families might not have any parcels for you?

BORMAN We'll have to wait till we get back.

QUESTION Frank, the Russians have indicated that some life forms they had aboard Zond 5 underwent some major changes -

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HANEY Yes.
BORMAN Paper.
QUERY Frank, the Russians have indicated that some life forms they had aboard Zion V underwent some major changes and are apparently attributing this to back radiation from the Moon and I was wondering if because of this or for any other reason you are going to take any extra precautions in radiation detection?
LOVELL Well, Jim, we have fortunately - I have - Jim has liver trouble and Bill Anders is a radiation expert so I can pass the question off to them.
ANDERS Well, I haven't heard about what the Russians are flying, but -
HANEY Turtles and all that.
ANDERS But we've had trouble with turtles in flight, too, but, ah (laughter) --
HANEY We had them there first.
ANDERS The analysis that I'm familiar with about radiation in and around the Moon, to my knowledge, will present a negligible problem, ah, we have given quite a bit of thought to the possibility of some extreme solar flares but I think you must remember that the command module is a relatively thick skinned vehicle and offers a very good so-called storm cellar in the event we would chance upon a very unusual flare. I don't think there's been more than about one or two solar flares during the time that we've recorded, ah, kept an eyeball on 'em that would really present a serious problem though certainly we'll have a considerable onboard instrumentation and air borne and ground borne instrumentation to keep an eye on the space radiation situation.
QUERY Frank, in a sense what you're doing here is really almost coming up to the point of getting set for the lunar landing. Aren't what you're really doing here is you're blazing the trail for the first lunar landing in a sense.
LOVELL Well, I hope that what we're doing will aid the people that participate in the first lunar landing. Of course, that's the real reason for going. If you're going to operate in the lunar environment, it seems to me that we ought to get out there as soon as possible and find out just what we need to do and how we can operate there. So, I think that this is the one chance that we have to really contribute to the landing program.
QUERY Jim, what do you expect the Moon is going to look like from 70 miles over it? How different from our views on it? What are you looking for?
ANDERS Well I expect that we'll see a lot more

ANDERS detail than we can see even from the orbital photographs. I'm also a little bit worried about it because all we have to work with, of course, are the orbiter photographs and one of the things that I'm concerned with is whether I can pick out the control points that I have been designated to look for and, ah, I have some gauges to go by, for instance the pseudo landing site crater is about 2000 feet wide and if I mentally make that four craters it looks like runway 35 at Ellington Air Force Base which I'm familiar with so I'm using little hints of that nature to try to help find the areas.

QUERY At 70 miles, how small an object do you think you could perceive? Is there any chance, for example, that you might be able to see a surveyor, who are intact on your path?

LOVELL Well, what we're trying to do is to look for these various things. Bill has some information on where the surveyor sites are. We're looking for glints of light off surveyor for instance. I'm looking for boulders of sizes of the lunar module to see if the command module pilot on a lunar landing mission will be able to pick up the lunar module. One of the best ways to determine the state vectors are the positions of the LM so that it helps the navigation of the rendezvous after the landing is to have the command module navigate or track on the lunar module while it's on the surface. And if I can pick up boulders about the size of the LM, this would give our people some idea whether this is possible or not.

ANDERS I think though in not leaving with the impression that the orbiter photos are not helpful that the point where the orbiter photos are very good will probably be in the dark during our December 21st day and as you progress around the backside of the Moon, the position - the absolute position of any feature becomes not too well known and the one advantage we have with the eyeball is that though we don't get the same resolution as the orbiter canvas could, we can at least look at any one item longer and possibly get a little more subjective feeling of what might be there where a photograph couldn't because we can integrate a lot wider range of light.

QUERY Bill, in view of the fact that orbiter had a 24 inch lens on it and you've just got a 3 inch lens I believe at the biggest, what do you hope to gain photographically?

ANDERS Well, the orbiter, of course, took its pictures at a particular lighting situation. Anytime that it took a picture around the Moon. Our situation for any point on the Moon will probably be different so we have a different lighting --

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ANDERS ... any plane on the moon will probably be a bit different. So, we have a different lighting situation we have the eyeball that can -- that can really make commentary on a point, trying to be photographic. Maybe the photography won't burn out, but we think that with the help of the photography and crew comments we might be able to add something to various detail positions. Now the script photography will give on the back side - give better position than the Orbiter photographs give in that area.

QUERY One question for all three of you. Frank you've decided it was a conservative mission, and the risk level low, still there must be an element of excitement in it for all of you. What do you think about when you, say wake up in the middle of the night and start thinking about this mission?

LOVELL Well, I think it is a very unusual mission from the past ones and I'm quite excited about it. I think that it is going to be quite a mission - revealing one - one that will first prove out the first stage of the two-stage Apollo mainline mission. That is, getting to the moon, orbiting, and coming back again. I am looking forward to it.

BORMAN Well, as a conservative mission - I didn't mean that I thought there weren't risks or dangers involved. And I don't subscribe to the schools that say you take more danger driving on a freeway and this sort of thing. Because you don't have to study the spacecraft - space program too closely to realize that we are flying the Saturn V and we have got elements of danger all along the way. But I can't help thinking when I see that vehicle that booster and the spacecraft, that we are looking at the best that American technology can produce. And I have confidence that it will be good enough.

QUERY Does the prospect of being away from your families at Christmas make any difference in your attitude to this particular flight? Your mental attitude?

BORMAN Christmas as such, I don't believe I could say it makes a - it makes a difference in the mental attitude because we are so intensely interested in training for the particular flight. Quite frankly, I don't, the past 7 years of the space program - 6 1/2 years that I have been in the space program have meant far more separations from the family than I like period. And doing this at Christmas is just another one of the burdens of doing what we are doing.

QUERY How have your kids reacted to the prospect of you being away at this particular time?

BORMAN The boys - I have two boys, one 17 and one 15 and they have - they are far more interested, rightly so, on their particular activity at school - they won their

BORMAN last football game last night and they don't get too involved in the - in our business. And I hope it stays that way.

QUERY How many hours a day are you having to put in for training for this mission?

BORMAN Well, we usually start out at the Cape about - we get up at 6:15 and get out to the simulator by 8 and usually end up around 11 or 12 at night.

QUERY Frank, is this lunar orbit mission too risky after only one manned Apollo flight?

BORMAN No Jules. As I said before - I can honestly say this, if I thought it was too risky, I don't know how the other two people feel, but I wouldn't be onboard. We have flown many unmanned Apollos as you know. We have the - the system history of the Apollo is fantastic in the testing and redundancy, the quality control, the care that we have made and then the changes that we have made since the fire. I think it is a safe vehicle.

LOVELL I concur with Frank, I think this is the natural step in our Apollo program, is to test the system as it was designed.

BORMAN I think we take our proportionate share - increased share of risk in order to make the flight following ours that much safer. I think if we went to the moon without doing this flight, we would be not anywhere as well off,

Systems man made a good point.

QUERY Borman, for how long - for how long will you be out of touch when you are orbiting behind the moon and in those periods of time, will you not be on your own?

BORMAN We will be on our own and it amounts to we can see around the moon about 18 degrees, so we are out about 45 minutes. The lunar orbit is around 2 hours and we will be out of contact about 45 minutes. You must remember that when we are in earth orbital - many times we are out of contact for a lot more than 45 minutes. Actually, remember on 7, they were floating around there at night time sometimes that long pass that comes down the west coast of South America and you feel nice and lonely about that one.

QUERY ... considerably more convenient flight communication wise.

BORMAN Yes.

QUERY May I ask another question about the radiation problem? If you should notify some bigger flares and major flares should come up there, what measure of protection what countermeasures do you have?

LOVELL We have no countermeasures other than the capability to possibly change our flight path.

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BORMAN We have no countermeasures other than the Cape could possibly change our flight path to avoid them though we don't look upon it as a radiation problem. We look at radiation as another factor in the environment that must be considered.

QUERY Do mean the radiation level of a major flare that what is inside of the capsule won't be too dangerous?

BORMAN That's right. It would have to be a very unusual flare and in that event I think we could take action to shorten the time that we'd be exposed.

QUERY Now for this German christmas program I would like to put another question. Christmas is to everybody (garbled) and now if you are so far out there in the vicinity of the Moon, (garbled) this all so lonely, desperately lonely in the wideness and darkness of space, ah, but then I would feel rather embarrased about the thought that on this small thing there in the outness of space people are not in peace with each other and so I wonder if you come home and if you will perhaps tell the people how it looked whether that could help some - give some new aspects to mankind as a whole of our situation, in this world and that this could really on a long view bring people back together because we are so often talking about what comes out of space, we are paying so much money for it, you pay that much money, the Russians pay that much money and they don't pay anything for that. (laughter) However, when we had the pioneers of space they were always talking and saying now this will be a new age of humanity. Do you have sometimes feeling of this kind and see some thinking that --

BORMAN I share your sentiment and I hope that this first step will lead to that cause certainly we can't say that our flight will lead everyone to live a harmonious life on Earth but I think that as the programs develop, both the Russian Program and our program, people are understandably going to get more of a sense of a one world type of an existance.

HANEY Paul Razor.

QUERY Colonel Borman, during Apollo 7, Wally Schirra recommended that you look over again your flight plan with an eye to the work and rest periods and possibly revising them. Did you follow his advice and did you revise them any after that?

BORMAN We looked them over but Jim and Bill are very - see we have a 20 hour period around the Moon where we're extremely busy. It's kin to a rendezvous type activity that Jim has participated in, I haven't, but the whole space the whole space flight plan will be leading up to that 20 hours around the Moon, so we know that we're going to

BORMAN have to make some compromises in order to have people awake during that 20 hours and I know we're going to be sleepy and I know we're going to be tired but we did look it over again and I think we've got the best we can do.

QUERY ... going to be testing?

BORMAN Pardon me.

QUERY Are you going to be testing?

BORMAN Ah, we're the last of the good guys. (laughter) --

QUERY You forgot about Gemini VII.

HANEY They got the white hat.

QUERY Do you play into making a Christmas type gesture from space?

BORMAN Well, I'll be secret I think - we'll have to think - we've already considered that and we'll have to - I think it would be inappropriate and quite frankly right now we don't have any idea what it might be. It won't be in the form of a TV spectacular though, I think we've already been outdone on those, so -- (laughter)

QUERY I was just going to ask about TV. What kind of television transmission do you expect we'll be able to see back here and have you started rehearsals yet?

BORMAN This is our producer, no the producer and director over here.

QUERY Cameramen.

BORMAN Cameramen, yeah. We have periods that we're working into the flight plan for television transmission both to and from the Moon and while in Moon orbit and we will try to have some inspacecraft shots and probably more of enroute and shots of the lunar surface in the lunar orbit.

QUERY What quality do you expect comparable to Apollo 7.

BORMAN I don't think we really know.

ANDERS We have a different antenna system but we're a lot further off so that's going to be just cut and dried. We'll do the best we can.

BORMAN We've had good quality with our camera in spacecraft tests on it.

LOVELL The lighting considerations out at the moon are important, too, to those transmissions. What's in the light and what's in the dark.

HANEY Frank, do you want to say anything about your setup here?

BORMAN Well, I thought we could - I could just give you a general outline of the lighting geometry and then I could let Bill and Jim talk about the particular elements of the lunar operations. I've drawn here the sunlight and

BORMAN the Moon, this is the Moon, the Earth considerations for December 21st launch. If this is the Cape, will inject here over the Pacific on the second opportunity which is about almost two rev's after liftoff. We'll proceed out again in the vicinity of three days, we'll burn what we call the lunar orbit injection burn here on the back side of the Moon and you can see this is shadow, this is sunlight and then we'll go into a lunar rev, ah ten lunar revs. Now, coming back, one of the things that we did in engineering that - this flight plan we considered the major possibility of concern is the systems problem in the Apollo. I was very anxious not to have to make a - an avert maneuver or an unplanned maneuver in order to come back early so we have scheduled the flight to come back earlier than it would ordinarily on a lunar mission because we have an access of velocity available to us. So we'll come back in a little over two days. Come back from the Moon over the dark Earth here and land about 165 west latitude, about 30 minutes before sunrise in the Pacific so we should be back early in the morning of the 27th and again you see, right after we land, we'll be in sunrise. Now the Moon itself will look like this. We'll be rev - er, rotating or orbiting in this direction, the areas that were of prime concern to us are right near the terminator and Jim why don't you explain that.

LOVELL Well, for the 21st, our landing site is just about between five and three degrees of the terminator and our idea now on the fourth rev is just go by and to check the landing site lighting conditions and we'll maintain the spacecraft in particular in the same type of position and we'll go by and we'll look at the lighting as we go past the five degree, the four degree and the three degree sunline. After that, we'll come back and we'll pick up control points on the backside of the Moon and I hope to see them, if I don't I'll pick my own control point, I will navigate on these three control points using the spacecraft computer system whereby it can then compute and get me back to the same control point by means of auto optics when I get back there again. After that, I'll come back to the landing site and we'll take navigation sightings on the landing site itself. All this data will be sent back to the Earth by the transmission by our communications system and they can then evaluate the, ah, the condition of our system, the quality of my navigation and the quality of the system itself. That's about the main - my main job in lunar orbit. Of course as I said before, one of the things that MSFN or the ground tracking network is doing is tracking the spacecraft around the Moon and determining just what it's orbit will be because if you remember correctly, several months ago there was some

LOVELL question about anomalies in the lunar surface that would perturb the orbit of a rotating body around it and we want to make sure we have a good handle on just what a vehicle around the Moon will do so in our later missions when we detach a LM and land on this landing site that we can then confidently know where it is so when the navigation is worked out for the rendezvous, it will be correct.

QUERY Jim, when you go behind the Moon will you be giving a voice report, your onboard tape recorder, as you ... things?

LOVELL That's right. To give you some idea of the landing site lighting conditions, as I go by, the spacecraft will be in position, I'll be looking through the scanning telescope and Bill or Frank depending upon who is up at the time will be ticking off a time for me and I'll pass first of all the IP. This is, by the way, the primary landing site, that's on the 21st - for a launch on the 21st of December. It starts in the Sea of Tranquility and actually the landing site is in the Sea of Tranquility. There are two particular IP's which we are looking for. One is a rill or cleavage in the ground and the second one is a diamond shape or a triangular shape mountain. Now this side has been photographed quite a bit and I'm quite familiar with this side. I've been studying the photographs of it and I feel that if we're anywhere near the proper orbit I'll be able to pick up this rill which is quite prominent. I'll have a time starting at that particular point which will then tie me into this --

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ANDERS - be able to pick up this rill, which is quite prominent. I will have a time starting at that particular point, which will then tie me into the second IP, initial point, of a triangular mountain, which is sort of by itself in the Sea of Tranquillity. From there, by timing, I will be able to work my way to the target point itself, which is a little crater some 2000 feet wide by a half submerged crater that is to the north. From there, I ought to be able to pick up the landing site itself. We are using - we call this a psuedo-landing site because this represents the lighting conditions of the area which we think is the best spot to land a LM at this present time. Of course, one of the main reasons is to evaluate that lighting condition to see if it is - does have the proper lighting.

QUERY If you lose the main propulsion system, can you get out of lunar orbit and get back?

ANDERS No. Once we are in lunar orbit, the main propulsion system has to operate.

QUERY Jim, geographically on your first couple of orbits, what are your points or where are you at apogee and where are you at perigee prior to circularization?

LOVELL Well, as we come on in, we will be coming in almost this direction and we will be probably in the sun most of the time. Our lowest point, our closest point of approach of pericynthion is about in this area up in through here, which is on the back side. Our main burn to slow down to get into lunar orbit is on the back side. We have scheduled it to burn such that we will be in an orbit of 60 miles by 170, nautical. This will put us in a 60 by 170, with the apogee of a high point towards the earth, then back to a low point. The second burn is called a circularization burn which will also be in approximately the same position. This will circularize our orbit, so that we are now in a 60-mile orbit around the moon. This gives us a good handle, it's about 2 hours of revolution and we have a pretty good idea of where we can pick up these control points.

QUERY Are you only going to look at that one side, or do you have several sides you are going to look at?

LOVELL Well, that's a good question. I didn't mention this, but if we do not lift-off, if we lift-off on the 21st, we have one area with four different particular landing sites. They are actually craters. It depends on what our launch azimuth is, which of course, depends on what time we lift-off in the launch window. If we miss the 21st, and say we go on the 22nd or 23rd, the terminator moves 13 degrees each day. So we move into a different area and one of the difficulties of this particular exercise is the

LOVELL fact that the three of us have to learn the different areas and four different landing sites for each particular launch day, if we do slip from the 21st.

QUERY Frank, when you three get up there, 25,000 miles or so outward bound, and can turn around and look at the earth and become the first three men in history to see it as entire globe. When you three get up there and become three men to see the earth as an entire globe and when you come up on the moon from 60 nautical, 70 statute altitude, what are you going to feel? What is it going to be like, first looking at the earth as a globe then the moon close up?

BORMAN I imagine it will be very exciting. I - of course, we haven't indulged in this, at least I haven't, in what we might feel, but I guess that in the back of your - everybody likes to contribute and I hope that some way that this feeling that was mentioned over here might - that this type of experience might lead to at least some basic understanding among the peoples of the earth. I have a feeling that when we look back there, it is going to seem rather insignificant, and it's certainly going to seem united. We felt this way in the earth orbital flights.

LOVELL That's right. When you get up into orbit, I feel that you can see so much that the problems that are so big down here on earth seem to shrink in proportion as the farther you get away from the earth.

QUERY Commander Borman, do you feel a sense of personal competition with the Russians in this mission?

BORMAN I don't feel a sense of personal competition with anybody on this mission. I do feel, I guess you could say, a sense of competition, perhaps not competition, but I feel a great deal of hope, I have a great deal of hope that we do this and do it first. We have been working at it for many years and I certainly think that we will lose any of the value of it if we perhaps don't do it first, but I would be less than candid if I said that I would like to be second it doing it. This is rather an anomaly to the hope that I expressed a minute ago, that everybody would be - but I do think that this is more in the spirit of friendly competition than an intense nationalistic effort to be first.

QUERY Are you trying to get some methods to get adaptations of your biological rythym to the space travel?

BORMAN Well, Jim and I, Jim has flown more than anybody else in history and I am close behind and we are just going to sort of nurse Anders along, I guess. (laughter) Poor Bill, he is having to live a - of course, I'm having

BORMAN problems too. They both graduated from Annapolis and that's a great handicap, I think. I don't think they will be any problem, though.

QUERY On the 7 flight, the TV onboard camera, when point out the window, didn't seem to respond too well. Has there been adjustment of this and is there a possibility then that you will point that camera out and give us a little more of a live close up look of what you're seeing, and the second part of the question, what about pointing the cameras back toward earth? What plans do you have there?

ANDERS In reference to your first question, the camera has not been modified, though we have discussed the problem - it was noticeable to everyone watching television though Apollo 7. We will make an effort then when the camera is out the window, that it is trained on some particular point on the ground, a track rather than fixed with respect to the spacecraft engine, and scan along so that you have - we have several views of some object on the lunar surface. Then we will move - swing the camera up ahead, and track something backing it. We think this might- image motion compensation will improve the quality of the television, plus the fact that we have been - become a little more aware of the automatic light control features of the camera and we will try to play these against whatever particular background we are trying to get detail on.

LOVELL - clouds really. One time we had it out the window, it was a very socked in situation along the Gulf Coast, we are not going to have clouds around the moon.

BORMAN With respect to your second question, I guess we will be trying to get some views of the earth on the way out and back and you won't have this problem then, at that time.

LOVELL Well, let me point out one thing though, too, so that everybody understands the problem we have. When we are transmitting television from lunar orbit, we have other difficulties with communication. Bill, why don't you go into that?

ANDERS Apollo 7 was sufficiently close to its receiving stations so they could transmit the television and voice on the omni antennas. You have four on them symmetrically located around the spacecraft, so spacecraft attitude was not a particular constraint to scheduling TV broadcasts. Our problem is, at lunar distances, we're using an FM transmitter. Now this FM transmitter must be transmitted through the high gain or parabolic antenna set. Since there is only one of these antenna, it must - we must schedule

ANDERS the television when the spacecraft attitude is such that that point of the spacecraft, or that side of the spacecraft is towards the center of the earth. There are times when our lunar landing site tracking tasks, or vertical strip photography attitudes preclude use of the high gain antenna. We will strictly be on the omnis for voice, so we are going to have to play the television with the high gain.

QUERY Frank, did you do any changing of your menu based on the Apollo 7 experience?

BORMAN Well, again, you see Jim and I had existed on this food before, so we had already planned our menu among that we liked. We did find, based on what Apollo 7 said, that some sugar had been added to some of the things, and we requested that they take that out, so that we are essentially going to fly what we flew with on Gemini 7. We put in some fish for Anders on Friday (laughter).

QUERY Jim, are you at all concerned about any white-out type situation on the lighted side of the moon?

LOVELL I suspect that we will perhaps see some of this near the subsolar point, or the point that - just beneath the sun where the features will be washed out and of course, this is one of the major items that Bill and I will be looking at, he in the photography and myself looking at the landing -

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LOVELL and of course this is one of the major items that Bill and I will be looking at, he and the photography and myself, in looking at the landing sites and the control point, will be to see just what effect does the sun angle have on the lunar features, so that a lunar landing crew can ascertain boulders and pitfalls and things of that nature in landing, and we hope to really evaluate this closely, and that's one of our major objectives.

BORMAN Anytime we are looking at the point on the moon where our head's shadow would be, it will have some degree of wash out, it is zero phase phenomenon, and I think this will be quite evident on the television. It will be a white spot wherever our shadow is.

QUESTION Has this mission benefited in any way from information that the Russians might have released or that NASA might have picked up from the Russians on their circumlunar flight?

BORMAN What information?

QUESTION Not a thing, huh?

BORMAN Well, I don't know - maybe it has, but we - at least I haven't been in direct contact with the people that might know. Jim has important connections in Washington, he might know -

LOVELL You might say that the Physical Fitness Council did not pick up anything that -

QUESTION Frank, could you tell us a little bit about the logic that lead to the suits-off reentry modifications?

BORMAN Well, the primary concern on the Apollo 7 flight was, of course, their head colds. All of us are very interested in flying without suits, as a matter of fact, this was one of the points of interest on our 7 flight, when we had some discussions with the ground people on taking off our suits. And again, it becomes a problem either way you want to look at it. You can function much better without the suits on, on the other hand, you lose some degree of redundantcy in the event of a leak, or a pressure problem, pressure halt problem. We are cleared to enter with or without suits on, as I understand it; we will have the capability. We are carrying now stirrups so that our feet will be held in place. And we will be able to enter with or without suits.

QUESTION Which is your preference?

BORMAN Well, the preference of course is without suits. You do have a problem though of determining where you can store them if you don't wear them, so they don't get in the couch stroke envelope. I don't think anybody that has ever flown likes a pressure suit, anybody that has ever worn one except perhaps the people that make it.

QUESTION What will be the sleeping procedure

while going around the moon; do you think you will be able to sleep there eventually with some pills?

BORMAN You must have been at our medical briefing this morning.

LOVELL Of course there are various factors about going around the moon and sleeping. You are in a new environment, not only this being in a spacecraft, and in space, but you are looking at an area that on the far side that has never been seen personally before. We have scheduled sleep periods, in that period, such that, and we have scheduled them, such that we do not cut into the basic mission. That is, the photography, the navigation, on the attitude controls of the spacecraft. Usually the periods are short; they are about 3 hours per man, and we have sandwiched them in where we could. It's not the best situation admittedly, but we are only there for 20 hours, and we want to get the most information consistant with safety, and we feel that just based on our human experience of just being there, knowing that you are not going to sleep for a full 8 hour period, that we feel that this is the way to go.

QUESTION You can sleep on the way home.

LOVELL We can sleep on the way home.

BORMAN Jim can't; he has to navigate.

QUESTION In preparing for the flight, have you people consulted the pictures of the far side of the moon that were taken by the Russians?

BORMAN We consulted primarily the lunar orbital photos. They are reasonably good quality; probably the best there is. We have those that came out in mosiac strips; we have used these primarily for our study.

QUESTION One other question on sleep. There was some feeling on the part of the crew of Apollo 7 that the whoever made up the sleeping bag arrangement needed some more schooling. What do you think will be your own problems; will you be sleeping more or less in your own couches or do you think you will crawl into the sleeping bag?

BORMAN This was - if I can answer this here - I got that impression. We were at the Cape during most of the Apollo 7 flight, and I got the impression from the news media that the hammocks weren't any good but we got to talk to Wally and they needed slight modification, but they always slept in them, and they said that they were very comfortable, so we have modified them so that the feet will be a little more restrained.

QUESTION About your reentry trajectory. Do we have to fly a reentry flight path straight like a parabolic curve or lets say like a elongated parabolic or eliptical path or can you even change this flight for the reentry pattern, changing it perhaps into a wave movement or so?

BORMAN Jim mentioned that one of the things that came out of this flight was some real honest to goodness looks at how the lunar mission should be flown, and if this is the earth, the way we have been talking about flying on a lunar orbit reentry was coming in, taking a - quite a G pulse, and then going out actually ballistic up here, so you are back at zero G. We looked at that for awhile, this gave you about a 2500 mile ranging weather avoidance situation on the earth, but the more we looked at it, the more we didn't like this portion of the flight where you went ballistic. So we modified as a matter of fact, we didn't have to modify anything, we have retargeted the flight path so that now when we reenter, we don't go back ballistic; it's almost a constant 4 G entry, and it's a very simple entry, it's one that is very amendable to back up. We have two means to back it up; and we have shown on the centrifuge that we can fly one successfully with just the G meter, so essentially we will come in here, lift up, and when we've reached the MAX G, which should be around 6 G's, we will roll the spacecraft so we are full lift down, you hold lift down till the G starts to lift up and then you modulate. This was if you have to fly a manual entry. And then you'd end up here about 1100 miles downrange. This is just one point where we have changed some philosphy as far as the Apollo program goes.

QUESTION How long would you have to be in the range of about 4 or 6 G?

BORMAN It was so comfortable I didn't even time it; it's nothing, maybe 3 or 4 minutes.

LOVELL The reentries are quite rapid and what we call super circular reentries, even more so than the normal earth orbital.

HANEY We are not going to try to top that record; they had a 3 hour press conference in Washington. Now we are planning to go into considerable detail Wednesday night down in Florida with Bill Anders going to bring all his cameras and his equipment for sighting, gear, and he's going to bring his geology advisor Jack Schmidt along. And we are going to talk in detail about what you are going to do. It's 7 o'clock and Jack King's office will know precisely where - I think we will probably do it on the beach, or would it be better out on the Cape?

QUESTION For Frank Borman. Now of course so far this - the quick advancement of the space technology has been partly due to this competition between America and Russia; there is no doubt about it. However, if we, for the last time, consider this question of humanity; what you personally think now you of course wear the American flag; and the Russians have always placed their emblems on the moon. Now would you personally be ready to say "All right, we could

as well do it with say, the flag of the United Nations?
BORAMN I don't know if you are aware, but on our Gemini 7 flight, we carried the flags of all the United Nations with us, and we certainly as I said before, hope this endeavor we are in leads eventually to some sort of an understanding. But quite frankly right now, I don't see anything particularly wrong with being proud of the flag, or being competitive in this friendly way that advances it. I hope we some way learn to control the competitiveness in the military standpoint, but I am a great free enterprizernist and I think that the compitition that's not only national but that individualism is of upmost importance to this program.
QUESTION You know that whenever the Russians (garble) that our system, not just our nation, but this whole Soviet and Communism system -

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QUERY ...you know, that whenever the Russians ... that our system - not just our nation, but this whole Soviet Communist system is superior or becoming superior, technically and scientifically (garbled) make a strong political point out of their success while I say America (garbled) more in the way of understatement which we like in our part of the world, but apparently we sometimes let impression the remaining mankind. So, do you think perhaps more - a little more propaganda could be made out of your flight?

LOVELL Well, I think that perhaps if we have a successful flight, the flight will have to speak for itself and I am not sure that all the embellishment that you put on it afterwards will ever be as important or stand as much as the significance of what we do. I think that is the way to do it.

QUERY Some musician among you perhaps to play at least Jingle bells on Christmas Eve? Behind the moon or in front of the moon?

BORMAN Well, 3 years ago - was it three years ago? - in Gemini VII, we rendezvoused with another spacecraft called Gemini VI and we had quite an accomplished musician onboard that spacecraft, Wally Schirra, and we have asked him for his harmonica, but he refuses to give it up. So I am afraid we will have to forego any musical accomplishment.

(garbled)

LOVELL They won't even lend us their television cards, so what are we going to do?

Laughter

Thanks very much

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