Pioneer III

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Code 5

PRESS CONFERENCE

BY

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December 6, 1958

1520 H Street, N. W.

Washington, D. C.

3:15 a.m.

P R O C E E D I N G S

MR. BONNEY: Ladies and gentlemen, by way of opening this up let me make this one little informal statement. I am not sure what our technical panel has in mind because they are busy on other aspects of this shoot.

The question of the U. S. Air Force space probe tracking network has been in action in an informal way as a backup to the Army JPL tracking facilities. These include the Jodrell Bank dish at Manchester, England, the tracking station at Hawaii, and the long-range radar at Millstone Hill, New Hampshire.

This data, if they got any -- and we are not quite sure yet whether they did or not -- is being fed into Ballistic Missile Division facilities at Englewood, California, and from there is being transferred over to the jet propulsion laboratory data computing center at Pasadena.

With that little bit of prefatory I would like to introduce Dr. Abe Silverstein, who is NASA's Director of Space Fleet Development.

Dr. Silverstein.

DR. SILVERSTEIN: Tonight at Cape Canaveral was fired the payload designated Pioneer III. The firing was functionally successful. All four stages fired as was announced earlier. It is too early yet to tell how wholly successful the flight has been. However, it is clear at this time that the projection velocity was some 400 meters per second low, and the elevation three and a half degrees low.

Later this evening we will know more accurately after computations are completed at the jet propulsion laboratory computing center in California from the data coming in from the various tracking stations as to what the final apogee of the flight will be.

Now to tell you something about the Pioneer payload and the booster system which put it into the air, we have representatives here from Jet Propulsion Laboratory, the ABMA, and the IGY.

I would like to introduce first to you Dr. William Pickering, the Director of the NASA Jet Propulsion Laboratory, Pasadena, California. The Jet Propulsion Laboratroy was responsible for the upward stages and the payload system for the Pioneer III.

Dr. Pickering.

DR. PICKERING: The launching system for the Pioneer III was saddled with the Jupiter missile and we have at the extreme left a model of the complete Jupiter plus high speed stages. Dr. von Braun will tell us more about that in a minute. Suppose I start from the front end and go back.

We have here a model of the actual payload. This is complete with the electronics. The Geiger counter and so forth are all here.

The principal experiment conducted in this payload was to measure the radiation field between here and the moon with two Geiger counters which you see in the center. In addition to this there was an optical experiment which was essentially a so-called light trigger, optical trigger, which was to be triggered off if and when the payload got within a certain distance of the moon. I think that descriptions of the essential features here are in the handouts which you already have.

There was no attempt made to photograph the moon or anything of that sort in this first payload.

You notice the payload contains a break at this point which is the antenna gap so that the system then is radiating at this frequency of a little less than a thousand megacycles.

At launch the payload is spinning at about 400 revolutions per minute, and about ten hours after launch the spin is reduced to almost zero by a simple mechanism which is shown here which consists of two weights which spin off by centrifugal force and transfer the angular minimum of the payload to these weights so that the payload spin is reduced to a low value. This was planned this way because of the optical trigger and later experiments in which one might want to use a slowly spinning object to have a good look at the moon.

The radiation experiments, as I said, consisted of two Geiger counters. The experiment here was designed by Dr. van Allen at the State University of Iowa and is an extension of our developing information about the radiation belt which surrounds the earth.

We hope to have data which will take us through the radiation belt to get some idea of the maximum radiation observed as it goes through, and the rate at which it falls off as we get past the maximum.

This pay load, to continue the description, is mounted on the fourth-stage rocket, as you see in the other model here. The cluster of solid propellant rockets is very similar to what was used on the Explorer, mounted in a spinning top just as it was on the front end of the Redstone, except that this time it is on the front end of the Jupiter. You notice, also, that it is protected by a shroud in its passage through the atmosphere in order to protect the payload from aerodynamic heating in passing through the atmosphere.

The signals from this payload were tracked primarily from stations at Puerto Rico and at Goldstone, near Pasadena, California. At the Puerto Rico station there is a ten-foot tracking antenna. At Goldstone the 85-foot antenna is out on the desert.

At the present time, Puerto Rico is tracking the payload and has tracked it from shortly after launching. The motion of the payload across the sky, as observed from Puerto Rico, was from as appearing in the northwest in the direction of Cape Canaveral, then moving across the sky and going almost to the eastern horizon -- in fact, very close to the eastern horizon on this particular path. It is now beginning to rise again and we hope it will be tracked from Puerto Rico for several hours yet.

About the time that it begins to set in the west again, as seen from Puerto Rico, it will become visible from Goldstone, and we expect to track it then from the Goldstone station. At the present time, of course, the probe is not visible from Goldstone and it is just being tracked from Puerto Rico.

I think that that is perhaps enough to add to what is in the press handouts. I think now our plan is to have questions after this. We will have another statement or two and then we will have questions.

MR. SILVERSTEIN: The booster vehicle was done by the Development Operations Division at the Army Ballistic Missile Agency, the group from the Ordnance Command at Huntsville. This work was done under the direction of Dr. Wernher von Braun, who is here on my right now. I will defer to him.

DR. VON BRAUN: On this space probe we used a modified version of the Jupiter intermediate-range ballistic missile as the first stage.

Due to the fact that the cluster, the high-speed cluster array, is somewhat lighter than the standard nose section of a Jupiter, we put elongated sections somewhat and extended the burning time. The actual burning time of this particular configuration was in the order of 180 seconds.

Maybe I can explain with the aid of this model here, the main difference between this configuration and the standard Jupiter.

In the case of the standard Jupiter, we have this well-advertised nose cone here, and we just took this off and replaced it by the stool for the spin-up cluster with the JPL high-speed stages. In addition to this, we elongated this section to some extent.

Due to the much higher speed required for this flight, and the shallower flight path, we tilted much more rapidly to a near horizontal direction, and it was necessary to protect the high-speed stages in the entire front end of the missile from aerodynamic heating. For this reason a shroud was built to protect the entire cluster assembly during the first stage flight.

During those 180 seconds of booster flight path, the trajectory is tilted at an angle of nearly twenty degrees against the horizon, a very shallow angle at the end. After this we have a free-coasting time of approximately one minute until we fire the second, third, and fourth stages. During this one minute of free-coasting flight, the nose section is detached from the booster. We separate the unit at this point and there is an altitude-stablization system which aligns this entire front end, the guidance compartment and the speed-up launcher in the right direction in which the high-speed cluster is to be fired.

Of course, it is necessary to open up the shroud for the firing of the stages. Shortly after the main stage cut-off, we separate here and this unit is still on. This entire unit is altitude stabilized compressed air mozzles, controlled by compressed air in a line in which the exact stage is to be fired. We have a separation in which this nose cap is thrown off. This thrust is detached by igniting explosive bolts and a solid rocket kicks this whole thing over to the side so that the cluster itself can fire.

I forgot to mention that at the moment of separation another little solid rocket kicks this booster in a backward direction to build up some distance between this free-coasting nose section and the booster. We did this in order to avoid booster run-up with the nose section which occurred in one of our Explorer firings.

As far as the top stages themselves are concerned, it would be more proper if Dr. Pickering would explain this. With your permission, I suggest we switch again.

DR. PICKERING: Carrying on the description of the trajectory, then, after this separation has occurred, as Dr. von Braun indicated, then the high-speed stages are ready to fire. The cluster of high-speed stages first comes out of the tub in this fashion. And then after the firing of the second stage, the firing of the third stage will lift off this group of rockets, and then we have the firing of the fourth stage. So that makes the whole assembly.

Finally, of course, we separate the nose section from the last stage, and then the final operation is a de-spinning operation which slows down the payload. This means that out in space then the payload plus the last stage will be travelling along fairly close to each other, with the payload actually de-spun.

MR. SILVERSTEIN: I think it is very clear from the descriptions of the booster system and the payload that these missile rocket systems that are joined together with the payloads for space flights represent one of the highest levels of technical and scientific achievement. And the functional, the complete satisfactory functional operation of this complicated mechanism, as has been accomplished tonight, is indeed a supreme achievement in the engineering sciences and the arts.

The program on Pioneer III was managed by the National Aeronautics and Space Administration, which is under the direction of Dr. Keith Glennan. It was authorized by the President as a part of the work to be carried on under the International Geophysical Year -- the IGY program.

We have a representative here who is the Chairman of the Satellite Panel of the IGY, Dr. Will Kellogg. We will hear from him now.

DR. KELLOGG: I will make this brief because I know you want to get on to the question period. I would like to say, though, on behalf of the National Academy of Science and the IGY National Committee that we feel that this successful, from the scientific point of view, launching of a space probe which will go far out into the radiation belt above the earth will mark a very definite contribution to the International Geophysical Year. I think we can all be very proud of this contribution by the United States to the IGY.

MR. SILVERSTEIN: This is the end of the formal program. I will be happy to answer such questions as the panel here is able to.

QUESTION: Where does it look like it is going to go, Dr. von Braun or Dr. Pickering?

DR. PICKERING: We are not far enough along in our calculations yet. We do have a position shown on this sketch behind us, which is the position of the probe relative to the earth at 3:26 a.m., Eastern Standard Time.

QUESTION: Would you read those to us? We can't see them.

DR. PICKERING: X plus 2-1/2 hours, distance 22,000 miles; speed 7,834 miles per hour. That is 22,000 miles above the earth.

QUESTION: Does it look like it has enough velocity to orbit around the sun?

DR. PICKERING: No, the velocity will definitely not be enough to escape --

QUESTION: Can you calculate from this whether it will be enough to exceed the previous high altitude 79,000 mark?

DR. PICKERING: We do not yet know this. There are calculations being carried out now in Pasadena which are based on the initial readings taken from Doppler stations on the mainland and the tracking station at Puerto Rico. The data from Puerto Rico has been sent to Pasadena and calculations are being carried out at this time.

QUESTION: What went wrong?

DR. PICKERING: What went wrong?

QUESTION: Yes.

DR. PICKERING: You mean, why is the velocity low?

QUESTION: Yes.

DR. PICKERING: I think it is too early to say that. I don't know.

Wait a minute. Let me make a statement here as to what we know about the velocity at the moment. The velocity, as Dr. Silverstein said, is about 400 meters per second below the expected or hoped-for value, and it looks as though the path is about three degrees below the expected injection angle. That is to say, being launched about three degrees lower than it should have been.

QUESTION: Dr. Pickering, will you translate the 400 meters per second into miles per hour?

DR. PICKERING: Eight hundred miles per hour too low.

QUESTION: What was the program velocity?

DR. PICKERING: Again I have it in meters per second. I have it in miles per hour: About 21,000 miles.

QUESTION: Are these statute miles per hour?

DR. VON BRAUN: The program velocity was 24,897 miles per hour.

QUESTION: Was that at burn-out?

DR. VON BRAUN: At burn-out of the fourth stage.

QUESTION: At what altitude would that be?

DR. VON BRAUN: That is approximately 223 kilometers.

QUESTION: What kind of miles are we talking about, statute or nautical?

DR. VON BRAUN: Statute.

DR. PICKERING: You want the nominal injection velocity? Is that what you want first? The nominal injection velocity was 11,136 meters per second. If you convert that to miles per hour it is about 25,000. But on my six-inch slide rule at this hour of the morning I am not sure.

QUESTION: Dr. Pickering, Dr. Silverstein said the upper stages all fired perfectly.

DR. PICKERING: All stages. The question as to where the velocity deficit came from, we are not quite sure yet. There is some indication it may have been in the first stage. But I think this will need more analysis.

QUESTION: Dr. Pickering, how close had you planned to come to the moon, and how close have you come with this velocity with the angle you now have?

DR. PICKERING: I am sorry I can't give you the answer to how close we will come. If we had been within about 20,000 miles of the moon we would have been very happy. However, we certainly are low enough in velocity that the transit time out into the vicinity of the moon will of course be much longer than the planned time of 33 hours.

Also, I can say certainly we will not get as far out as the moon's orbit. Exactly how far out we will get I will just have to ask your indulgence and we will give you this as soon as it can be computed.

QUESTION: Dr. Pickering, do you think you will get further out than Pioneer II?

DR. PICKERING: I won't answer that question. I don't know. I just frankly don't know.

QUESTION: Do you have any idea how long it would take this vehicle to reach its apogee, its zenith?

DR. PICKERING: It will be several days.

QUESTION: Would that be say Monday or Tuesday?

DR. PICKERING: Again I will have to wait until we have more data. Let me tell you this: We should have this data in a few hours. We expect to hold another press conference at perhaps 8:00 o'clock in the morning.

QUESTION: Saturday morning?

DR. PICKERING: Saturday. At that time I hope we will have much more precise trajectory information than we have now. It is just too early to give you anything very precise.

QUESTION: Can you tell us what you will now find out, probably, with this trajectory and this distance in the way of information about the radiation belt and other things that you had intended to find out?

DR. PICKERING: Yes. The most important measurement that this instrument was to make was the radiation measurement. And this is being made.

QUESTION: I am sorry I couldn't hear you.

DR. PICKERING: The most important measurement which we expected to make was the radiation measurement. The telemeter data is being received. There is no time to look at this. But the information is that the telemeter data is very good. We hope we will get good radiation measurements for a considerable distance out between the earth and the moon.

It is expected by Dr. Van Allen that the maximum of the radiation belt will be reached somewhere perhaps less than

20,000 miles away from the earth. Therefore, we will certainly expect to go through the maximum and get good information on the radiation belt.

QUESTION: Will you find out as much with this trajectory the way it is working as you would have if it had worked the way you wanted it?

DR. PICKERING: Yes. From the point of view of the radiation measurement we will get practically all the data that we had wanted to get. In other words, it is not expected that the radiation intensity will change very much once we are perhaps 50,000 miles or so beyond the earth.

QUESTION: Are you going to be able to tell what kind of radiation it is?

DR. PICKERING: No, sir. This is a very simple measurement with Geiger counters.

QUESTION: So we won't know?

DR. PICKERING: We need much more elaborate equipment to give that answer. We may be able to deduce this information from an analysis of how the radiation behaves with respect to the magnetic field of the earth. But it will be an indirect measurement not a direct measurement.

QUESTION: In San Antonio Dr. Van Allen expressed the personal opinion that the radiation intensity might very well reach 100 Roentgen and they wouldn't be surprised at a thousand

Roentgen. I notice in the fact sheets you state that the maximum intensity these devices can record is 100 Roentgen per hour?

DR. PICKERING: That is true. This is an instrumental limitation. It may well be that the instrument will indicate that the intensity goes above that. If it does, this is useful enough. But it was a question of instrumental limitations and that is all.

I might point out that the data which has already been received at Puerto Rico has probably taken it through the maximum radiation belt. We are out here 20-odd-thousand miles and we are probably beyond the maximum now.

QUESTION: Dr. Pickering, what do you anticipate will happen to the payload after it reaches its farthest point, its farthest distance?

DR. PICKERING: From the apogee? It will fall back and probably fall to earth again. In fact, it certainly will fall to earth and burn up, of course, on re-entering the atmosphere.

QUESTION: There is no chance of it going into orbit around the earth?

DR. VON BRAUN: The perigee is lower than the injection point.

DR. PICKERING: No, it will not.

QUESTION: Why?

DR. PICKERING: Because it is launched above the horizontal. If it had been launched horizontally it would have been into it. But it was launched appreciably above horizontal.

QUESTION: What is the difference in the Geiger counters in range?

DR. PICKERING: one of these Geiger counters is a counter which counts every particle which passes through it. The other is a Geiger counter which has been modified to measure much higher counting rates than the normal Geiger counter.

The standard Geiger counter, in other words, will saturate at fairly low radiation levels. The second instrument here will carry it on up to about 100 hours.

QUESTION: What is the range?

DR. PICKERING: About ten hours.

When one is quoting figures, this is a little deceptive because it depends on what you assume about the nature of the radiation, as to how many particles are involved.

QUESTION: Ten in a hundred is based on what?

DR. PICKERING: Electrons.

QUESTION: Dr. Pickering, was your burn-out speed of 24,987 miles per hours, the program speed, sufficient for earth escape velocity?

DR. PICKERING: The program burn-out?

QUESTION: The program burn-out velocity.

DR. PICKERING: This would have taken us out to an orbit, which would have had a perigee well beyond the moon. Let's put it that way.

QUESTION: Do you mean apogee?

DR. PICKERING: I am sorry.

The answer to your question is Yes, it would have gone out into an orbit around the sun.

QUESTION: Because it came close enough to the moon to flip it or something?

DR. PICKERING: No.

QUESTION: Could you explain the mechanics of that?

DR. PICKERING: Just that it went fast enough to get away from the earth and not return to it.

QUESTION: Then it did reach escape velocity?

DR. PICKERING: Yes.

QUESTION: Did you put a margin of safety into this safetywise?

DR. PICKERING: Margin of safety to reach the moon, yes. For escape, yes, there is a small margin for escape. I don't know what the minimum is for escape. It is roughly about a 300-miles-an-hour margin above escape velocity.

QUESTION: Dr. Pickering, I am sorry, I came in late. I heard you say as I came in that it would fall back to earth. What happened?

DR. SILVERSTEIN: I think we ought to repeat these questions because some are not hearing them in the back of the room.

DR. PICKERING: The gentleman said he came in late and he heard me say it would fall back to earth and he wants to know what happened. The answer is that the velocity which had been attained was about 400 meters per second below the expected escape velocity which we had planned for.

QUESTION: Which was?

DR. PICKERING: This, then, will put it into an elliptical orbit which will have an apogee somewhere between here and the moon or the moon's orbit, and which will therefore return back to earth.

QUESTION: How much could you have missed by and still have reached the moon as far as velocity is concerned?

DR. PICKERING: The minimum velocity to reach the moon is about --

DR. VON BRAUN: Why don't we read off the figure we have here? This is meters per second again.

The design speed that we are shooting at was 11,136 meters per second. This would have put the fourth stage into an escape hyperbola which would have passed the moon after about 34 hours transit time.

The minimum speed to reach the moon at all would be 10,840 meters per second, which is approximately 300 meters per second less.

With this minimum speed the rocket would have gone into an ellipse -- not an escape hyperbola but an ellipse with the apogee into the moon's orbit, and the transfer time would have been to 100 hours. This is the minimum speed it takes to carry the rocket out to the moon's orbit.

The actual speed was not 300 meters per second shy with respect to the design escape speed but 376, or not quite 400 meters. This is a preliminary figure.

DR. PICKERING: As a preliminary guess then we are about 100 meters per second too slow to carry the apogee to the moon.

DR. VON BRAUN: This is very sensitive.

DR. PICKERING: The actual apogee altitude is very sensitive to this. These are initial calculations. As more data come in these will be refined.

QUESTION: Velocity to go out into orbit around the sun, the minimum velocity?

DR. VON BRAUN: That is the escape velocity. Anything leaving the rotational field of the earth goes automatically into orbit around the sun.

QUESTION: What was the design velocity?

DR. VON BRAUN: Design velocity would have provided escape.

DR. PICKERING: Design velocity was roughly about 160 meters a second above escape velocity.

QUESTION: 11,286?

Do you know yet which stage it was?

DR. PICKERING: Maybe we should put some numbers on the board. We will give you meters per second because it is tabulated that way.

These figures, for those of you who are mathematically inclined, are in the space-fixed Gordon system and for launching across approximately this trajectory.

QUESTION: What are these figures in?

DR. PICKERING: Meters per second.

I would like to emphasize again that this last figure is a preliminary figure.

QUESTION: What did you say the conversion factor is? 2.2 to miles?

DR. PICKERING: I beg your pardon?

QUESTION: Is the conversion factor 2.2 to miles?

DR. PICKERING: That is what Will tells me.

Are those statute miles?

DR. KELLOGG: Nautical miles per hour.

QUESTION: 2.2 is to nautical?

DR. KELLOGG: I believe if I remember right that is conversion to nautical miles.

Why don't we leave it at meters per second?

DR. PICKERING: It is a good exercise for you. We school teachers say it is a good exercise for students.

QUESTION: What was the total powered flight, total time?

DR. PICKERING: The total time of powered flight was about three minutes for the first stage and each of the other stages. The combined time for the other stages is about half a minute.

MR. SILVERSTEIN: Gentlemen, I think we have had a considerable period of questions here. We will have a few more and call the session closed. Suppose we have three more questions.

QUESTION: Can you tell us something about the photoelectric scanning mechanism and the purpose of that experiment?

DR. PICKERING: It is hoped that later moon probes will give us pictures of the moon, and this particular probe is a simple photoelectric switch, one might call it, which was designed to operate an optical system in a later probe so that when the probe reached the vicinity of the moon the camera system, whatever it may be, could be turned on to take the necessary pictures. In order to turn it on, then, you need something that says the moon is now inthe field of view. This is just a simple photoelectric device which tells you that at that particular instant of time the probe is looking toward the moon; that is all.

QUESTION: Will you get a telemetered signal back when it turns on?

DR. PICKERING: Yes.

QUESTION: Or you would have?

DR. PICKERING: We would have, yes.

QUESTION: But if it doesn't come close enough, you won't?

DR. PICKERING: That is right.

QUESTION: Why didn't you use a scanner? Is it too heavy? A ground scanner.

DR. PICKERING: Why didn't we take photographs? This experiment was a simple experiment, first to test out the system and to perform this radiation measurement.

QUESTION: How close would this one have to come to trigger?

DR. PICKERING: About 20,000 miles.

QUESTION: What did you do to prevent the sun from triggering it?

DR. PICKERING: It is pointed in such a direction that it will not look at the sun. You see, it is stablized in direction. The problem is to prevent the earth from triggering it. And this is not activated until it gets a long way from the earth.

QUESTION: Are you sure you can call this probe a success?

DR. PICKERING: It is obviously not a hundred-percent success. From a scientific point of view, it is very close to being a hundred-percent success. From the engineering point of view, we did not attain all of our objectives.

MR. SILVERSTEIN: Gentlemen, those are our three questions.

We will hear from Mr. Bonney now.

MR. BONNEY: First, I will dare to give you a conversion factor on this meters business. If you take a thousand meters, you have one kilometer, and one kilometer is .621 miles.

I will repeat that. A thousand meters is one kilometer, is .621 miles.

While this conference was going on I was on the hot line to the Cape. One thing, I think, that we didn't do here sufficiently and Dr. Glennan did very emphatically down at the Cape was to extend his very sincere thanks to the Army team, to the team at our new NASA Jet Propulsion Laboratory at Pasadena, and to the scientists who provided the instrumentation that went into Bill Pickering payload.

Finally, we think we can give you a considerably more accurate account of what the apogee is likely to be about eight o'clock this morning. If, however, some of you sleepy-heads would rather make it nine o'clock, we will be happy to oblige. I would like to take a voice vote.

All in favor of eight?

All in favor of nine?

We will settle for nine o'clock. We will reconvene at nine o'clock, gentlemen.

DR. PICKERING: This is a final comment. At that time the Goldstone station, of course, should be tracking the probe.

(The conference was concluded at 4:00 a.m.)

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